# PATHOLOGY LAB


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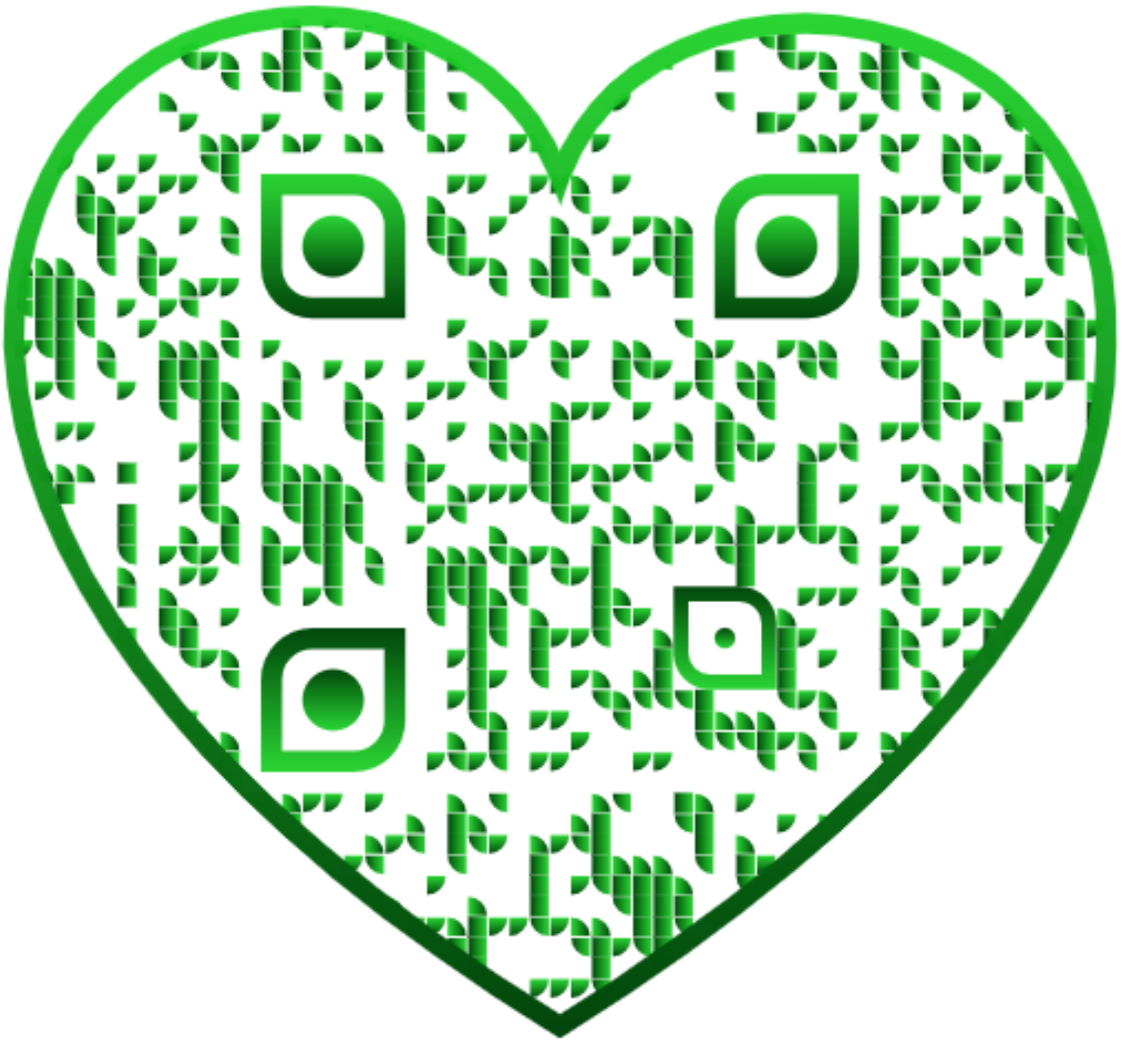


# CELL INJURY & ADAPTATION

# Hypertrophy (of the heart)

**Diagnosis :**

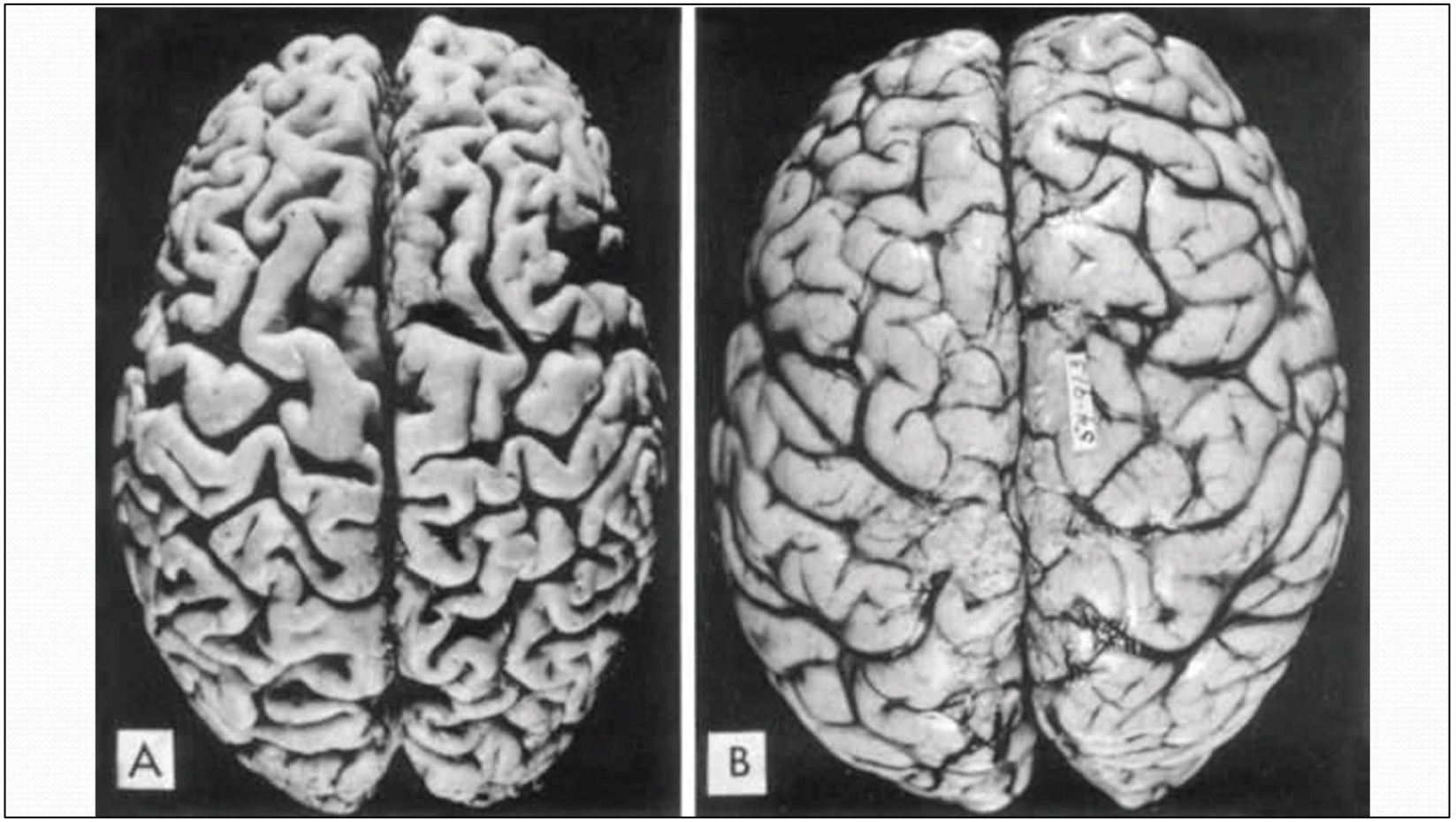
Hypertrophy of the heart

**Characteristic features :**

-**Grossly** : Thickening of the cardiac wall

-**Microscopically** : Enlargement of the cells

# Atrophy (of brain)




**Diagnosis** :

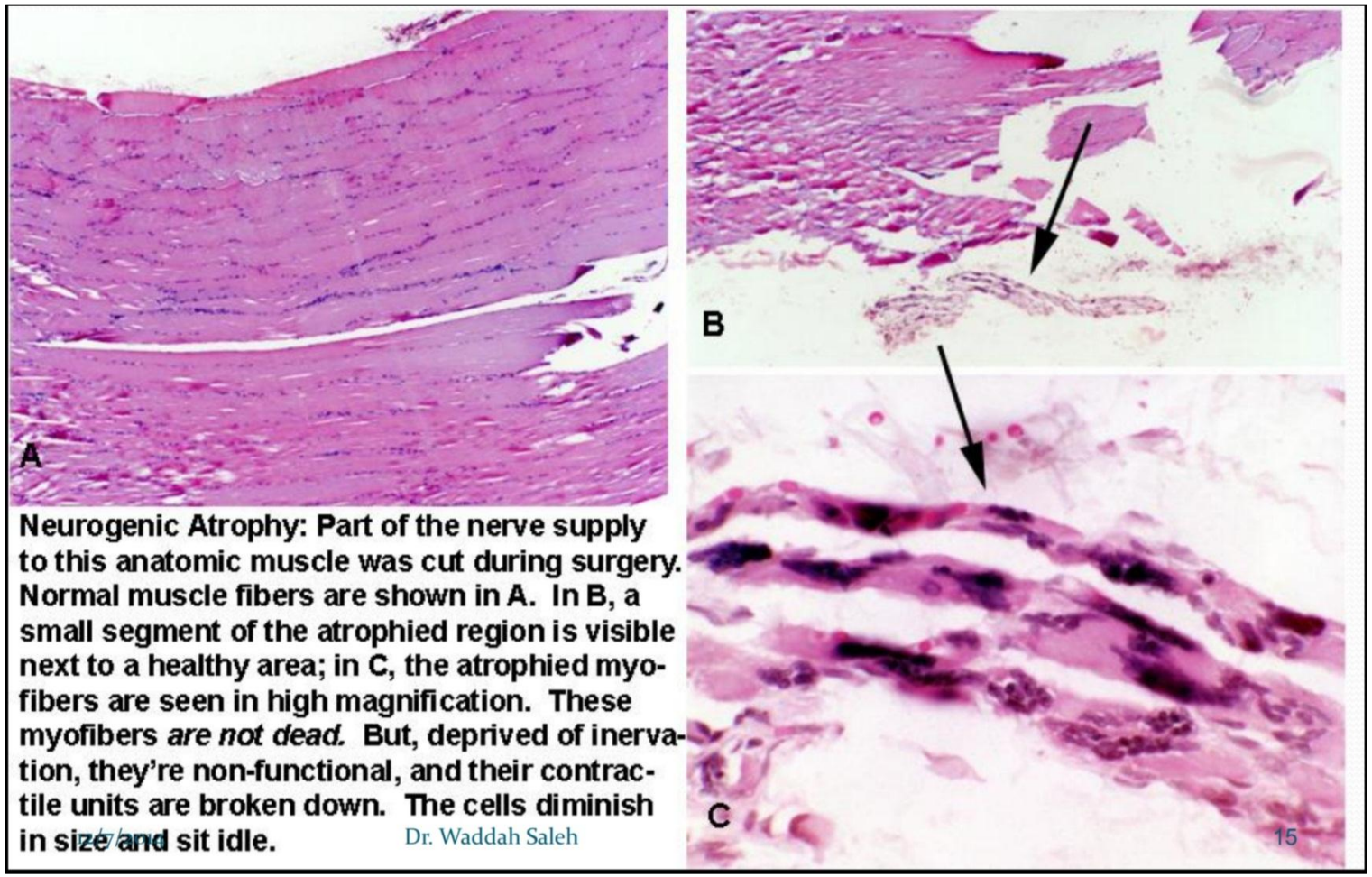
Atrophy of the brain

**Characteristic feature :**

-Widening of the sulci

-Narrowing of the gyri

# Atrophy (of the skeletal muscle)


A
B
C
Neurogenic Atrophy: Part of the nerve supply to this anatomic muscle was cut during surgery. Normal muscle fibers are shown in A. In B, a small segment of the atrophied region is visible next to a healthy area; in C, the atrophied myofibers are seen in high magnification. These myofibers *are not dead.* But, deprived of innervation, they're non-functional, and their contractile units are broken down. The cells diminish in size and sit idle.
Dr. Waddah Saleh
15

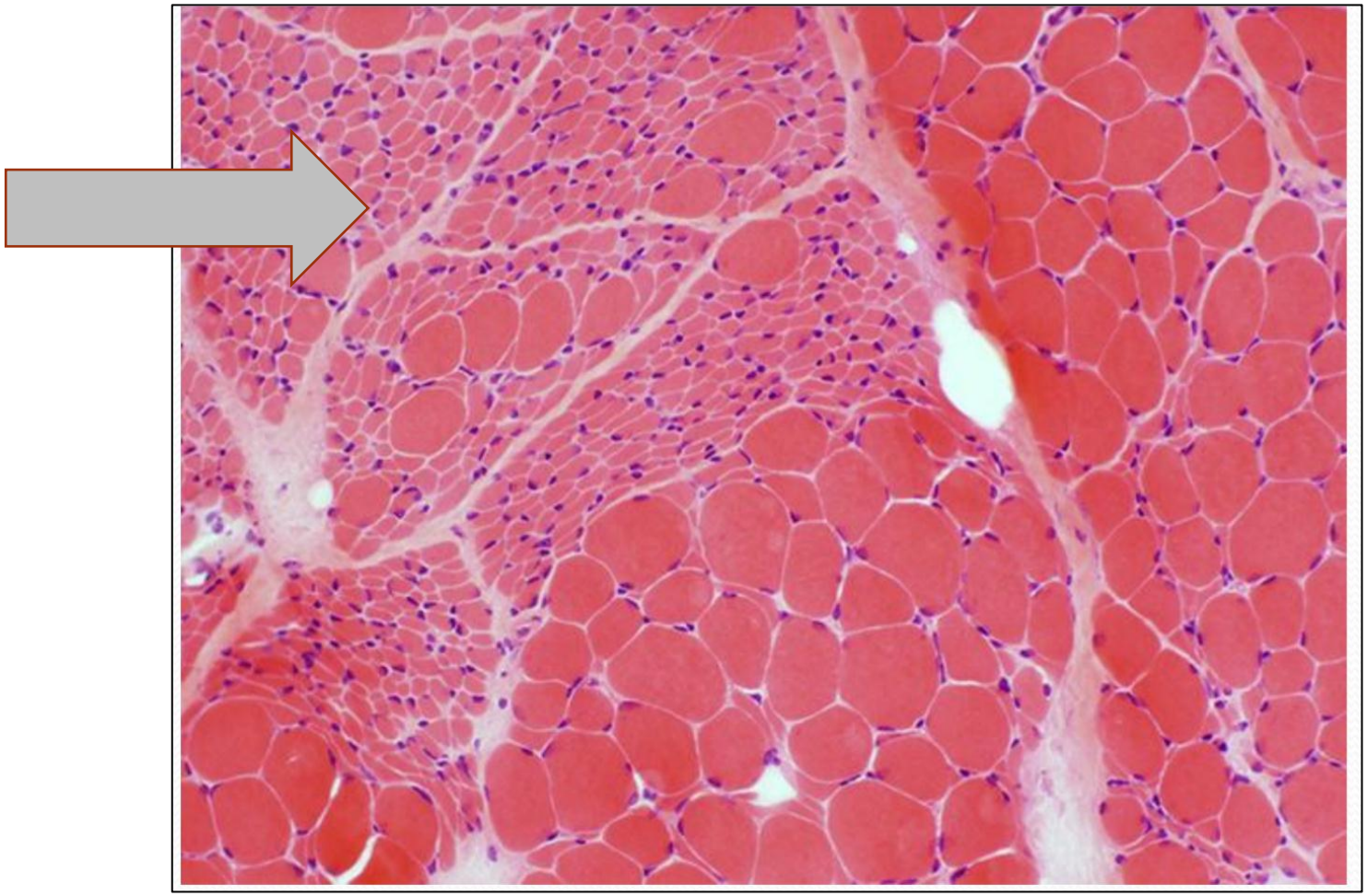
**Diagnosis** :

Atrophy of the skeletal muscle

**Characteristic feature** :

Decreased size of the muscle cells and paler in staining than normal

# Atrophy (of the skeletal muscle)



**Diagnosis** :

Atrophy of the skeletal muscle

**Characteristic feature** :

Decreased size (shrinkage) of the muscle cells

# Hyperplasia

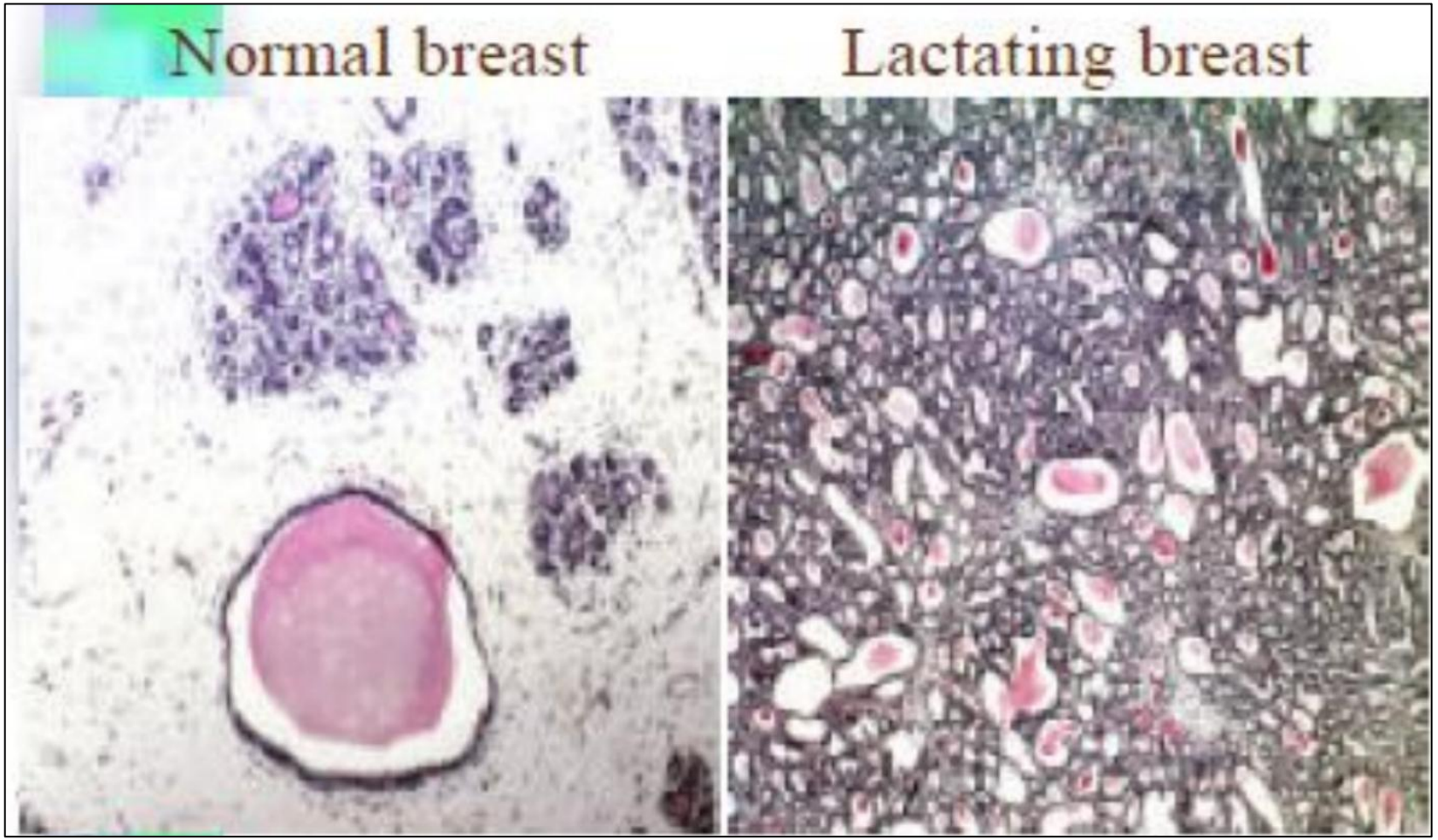
**Diagnosis :**

Hyperplasia of the uterus

**Characteristic feature :**

Enlargement of the uterus with increased thickness of the wall (includes both hyperplasia and hypertrophy )

# Hyperplasia



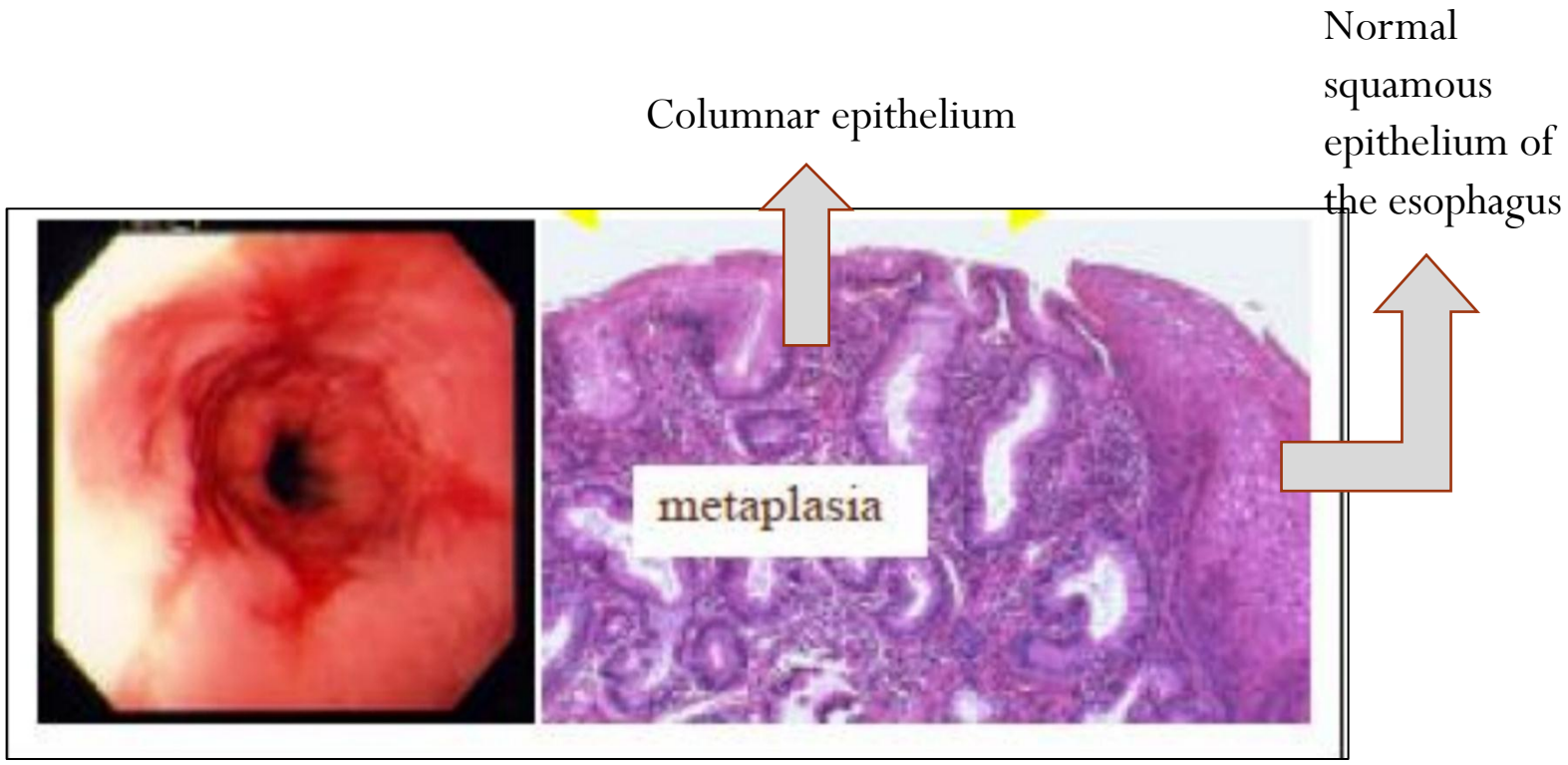

**Diagnosis :**

Hyperplasia in the lactating breast

**Characteristic feature :**

Increased number of glands and less fatty tissue

# Metaplasia (Barret esophagus )




**Diagnosis :**

Metaplasia of the esophagus (Barret esophagus)

**Characteristic feature :**

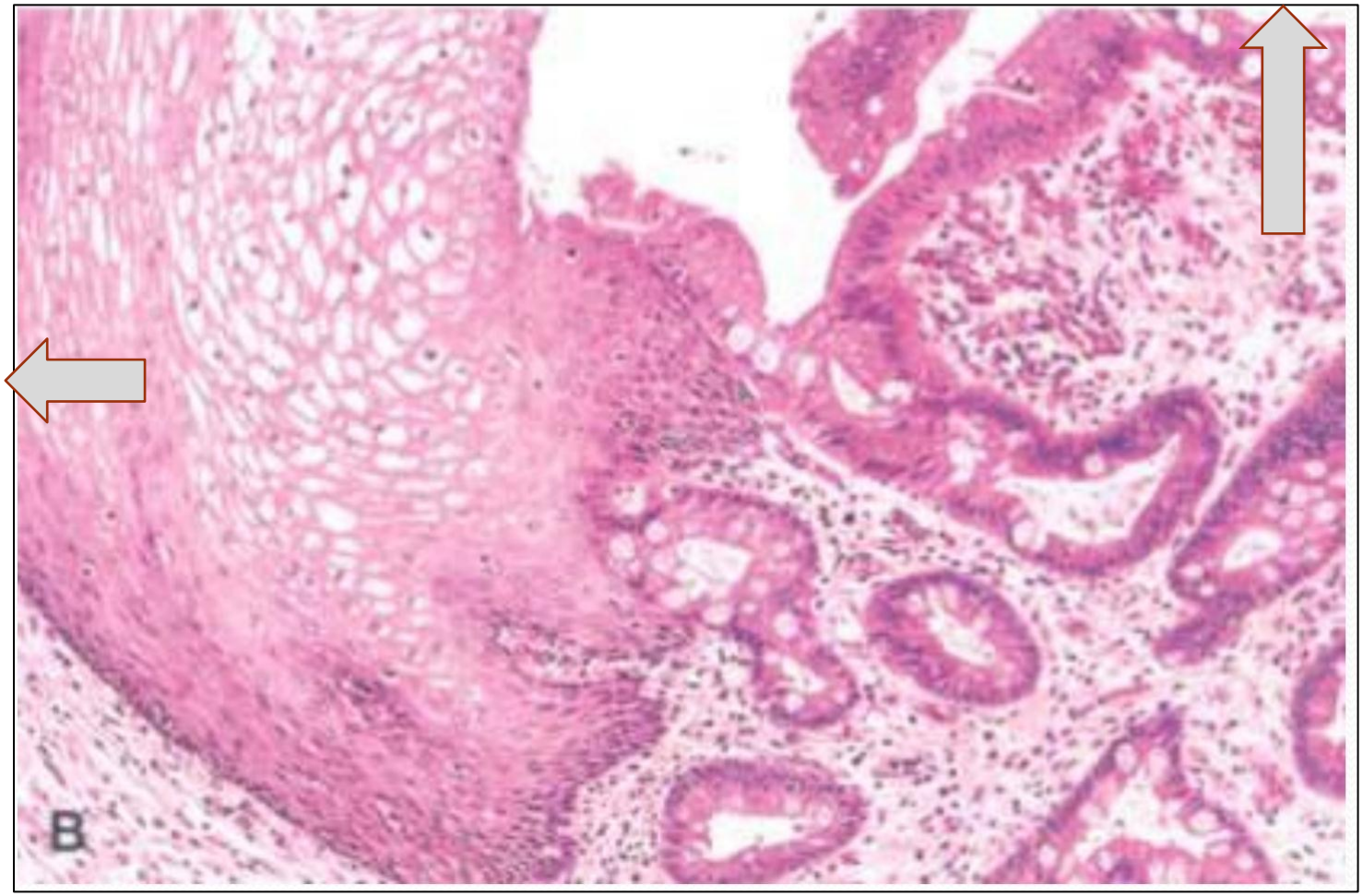
**Grossly :** The metaplastic areas are redder than normal

**Microscopically :** Change of the epithelium from stratified squamous to columnar epithelium with goblet cells

# Metaplasia (Barret esophagus )

Columnar epithelium

Normal squamous epithelium of the esophagus




**Diagnosis :**

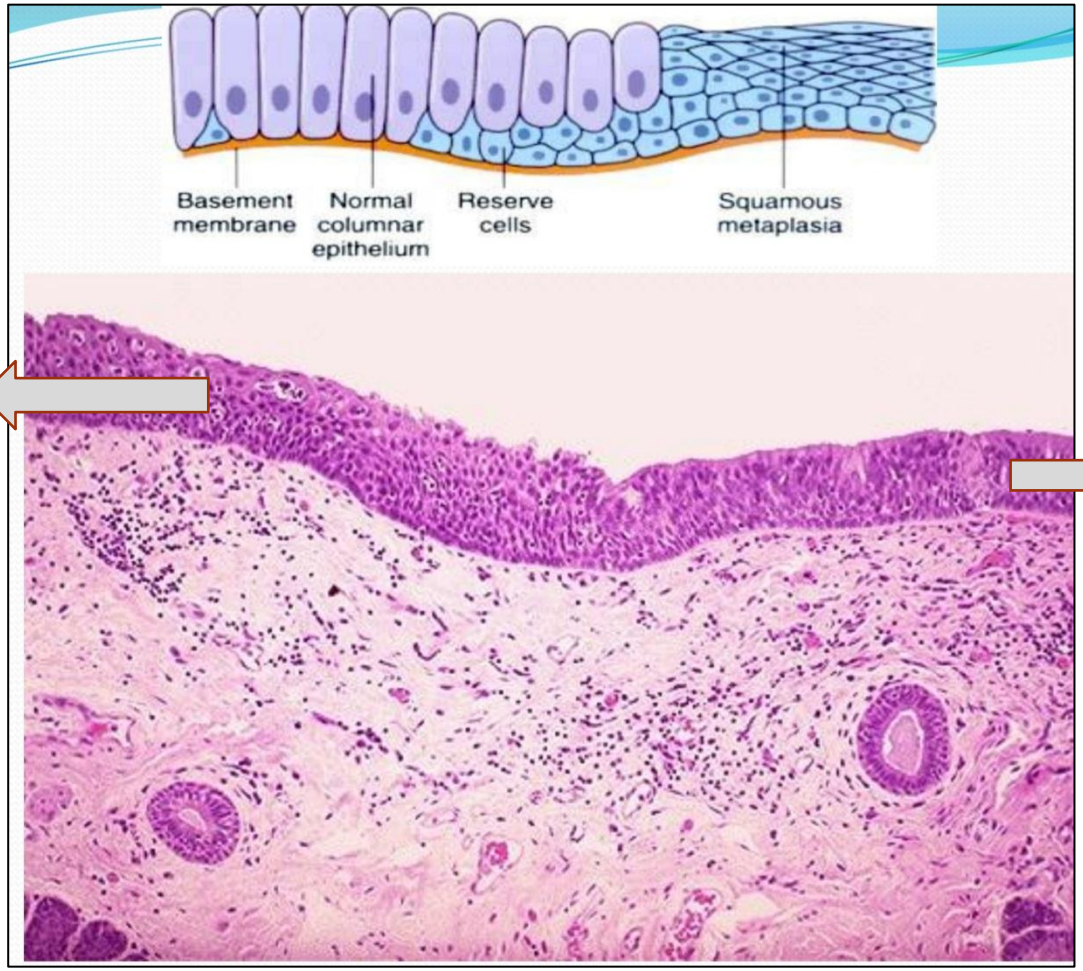
Metaplasia of the esophagus (Barret esophagus)

**Characteristic feature :**

Change of the epithelium from stratified squamous to columnar epithelium with goblet cells

# Metaplasia (in bronchus)

Squamous epithelial metaplasia




Normal pseudostratified ciliated columnar epithelium

**Diagnosis :**

Squamous metaplasia of the bronchial mucosa

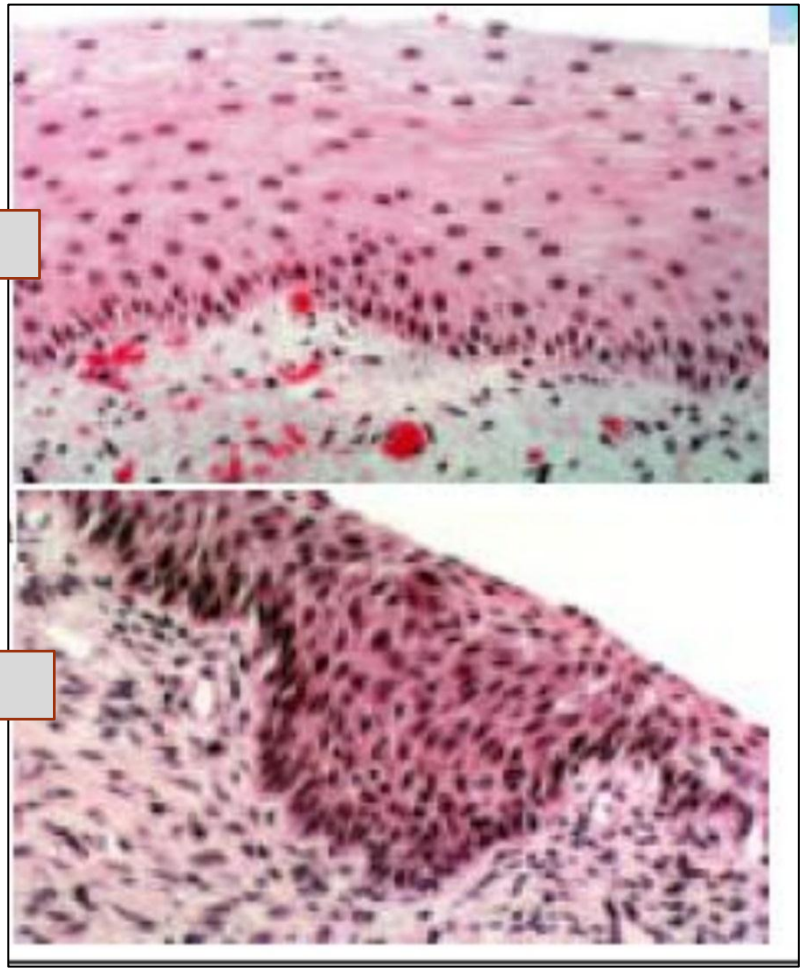
**Characteristic feature :**

Changing of pseudostratified epithelium to stratified squamous epithelium

# Dysplasia (in the uterine cervix)

Normal stratified squamous epithelium of the uterine cervix

Uterine cervix dysplasia



**Diagnosis :**

Dysplasia of the uterine cervix

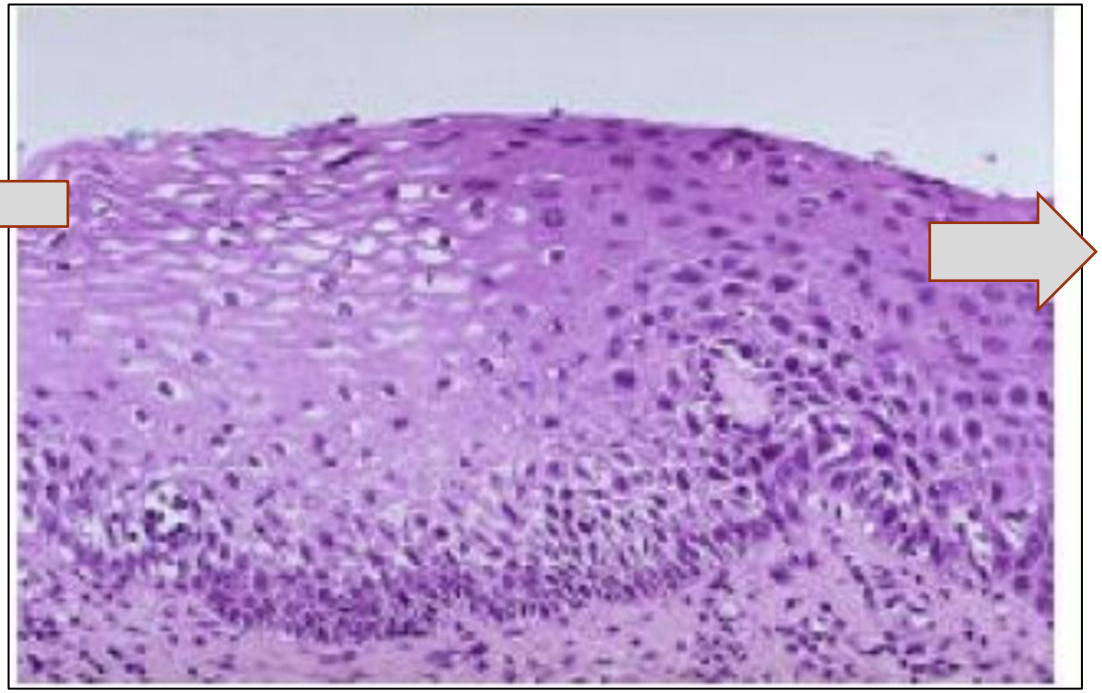
**Characteristic feature :**

-Loss of cellular stratification/differentiation (the nuclei are large and hyperchromatic in all layers )

-Loss of orientation (cells are directed randomly)

# Dysplasia (in the uterine cervix)

Normal stratified squamous epithelium of the uterine cervix



Dysplastic squamous epithelium

**Diagnosis :**

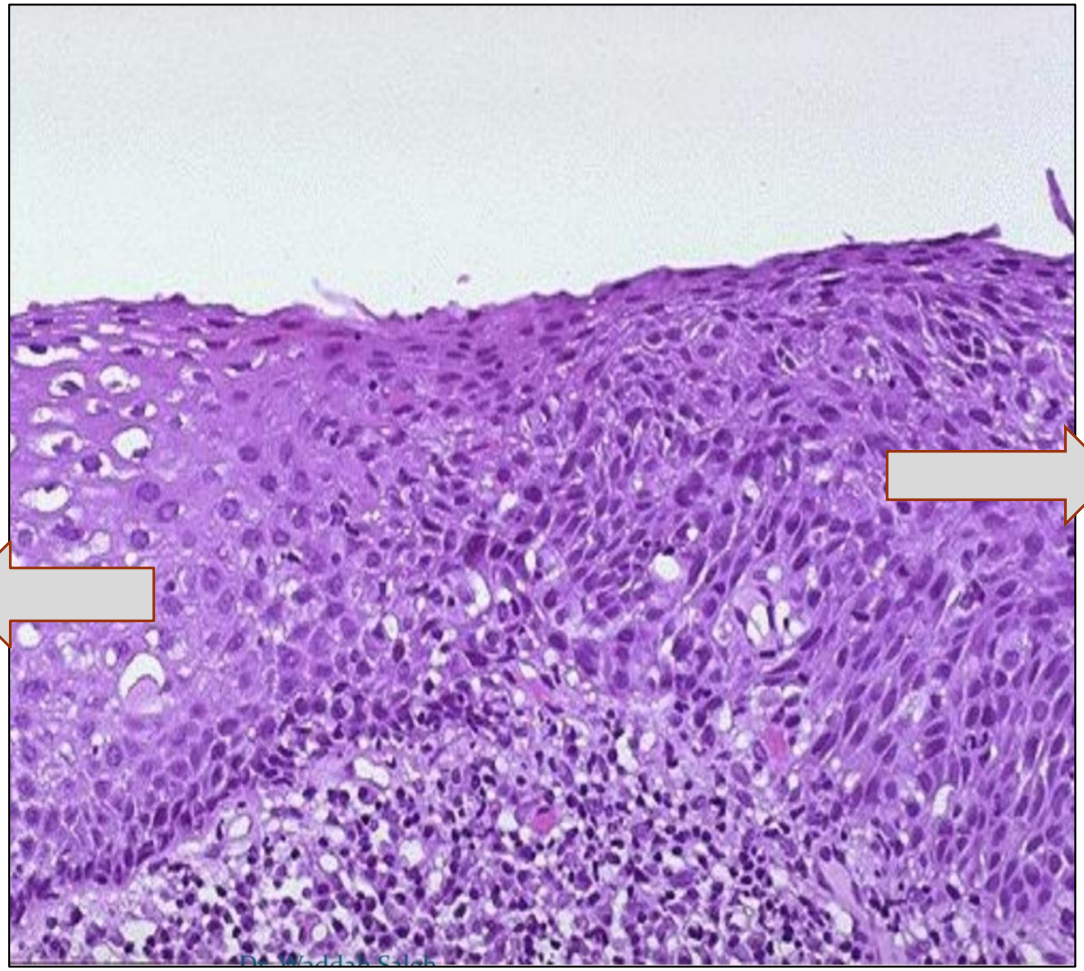
Dysplasia of the uterine cervix

**Characteristic feature :**

-Loss of cellular stratification/differentiation (the nuclei are large and hyperchromatic in all layers )

-Loss of orientation (cells are directed randomly)

# Dysplasia (in the uterine cervix)



Normal stratified squamous epithelium of the uterine cervix

Dysplastic squamous epithelium

**Diagnosis :**

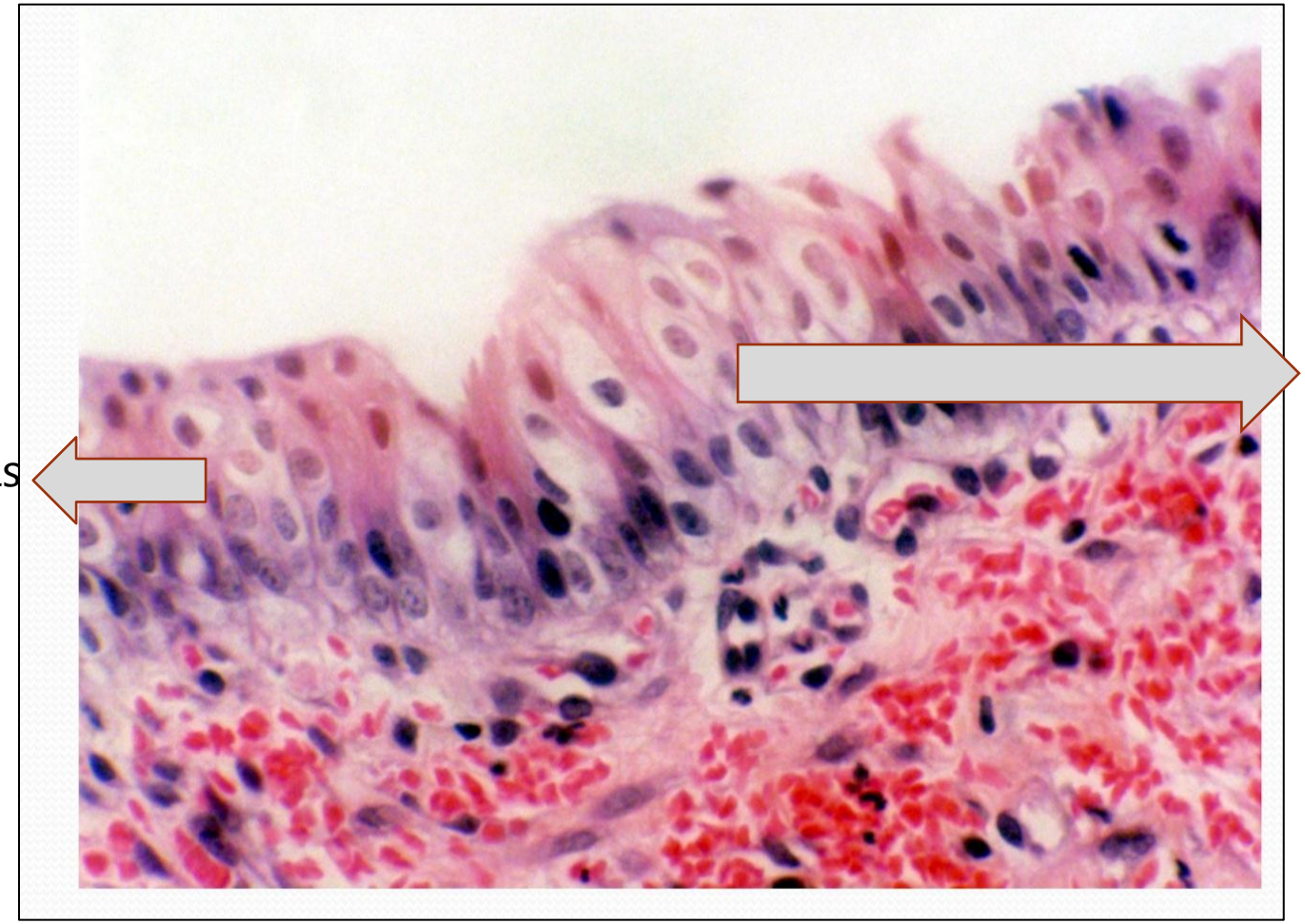
Dysplasia of the uterine cervix(severe)

**Characteristic feature :**

-Loss of cellular stratification/differentiation (the nuclei are large and hyperchromatic in all layers )

-Loss of orientation (cells are directed randomly)

# Cell swelling (reversible cell injury)



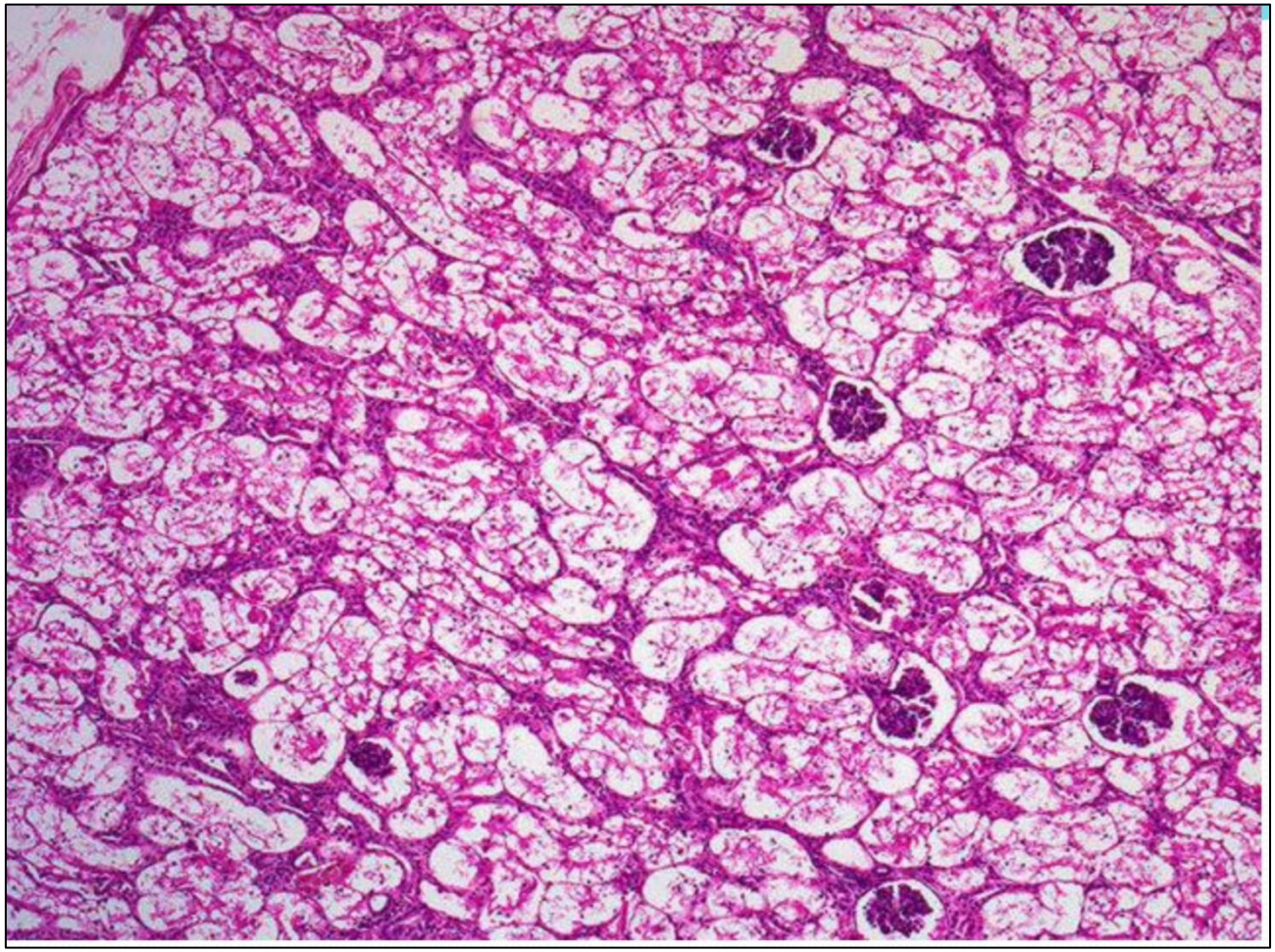

**Diagnosis :**

Cell swelling (reversible cell injury)

**Characteristic feature :**

Enlarged clear cells with pale staining due to fluid accumulation

# Cell swelling (Hydropic change)



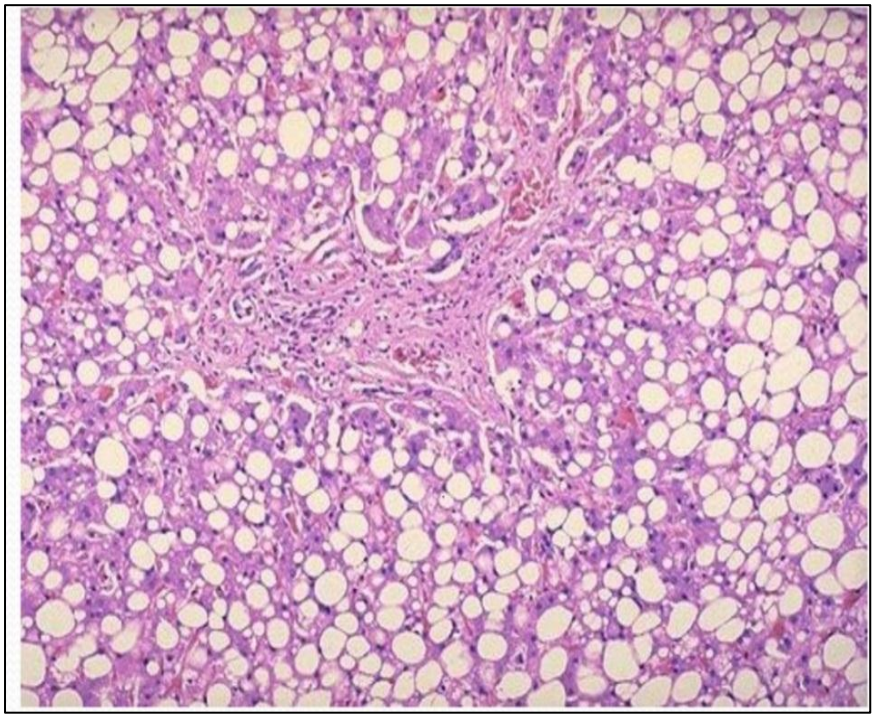
**Diagnosis :**

Hydropic change (reversible cell injury) in renal tubules

**Characteristic feature :**

Swelled renal tubules due to swelled cells filled with fluid

# Fatty change of the liver



**Diagnosis :**

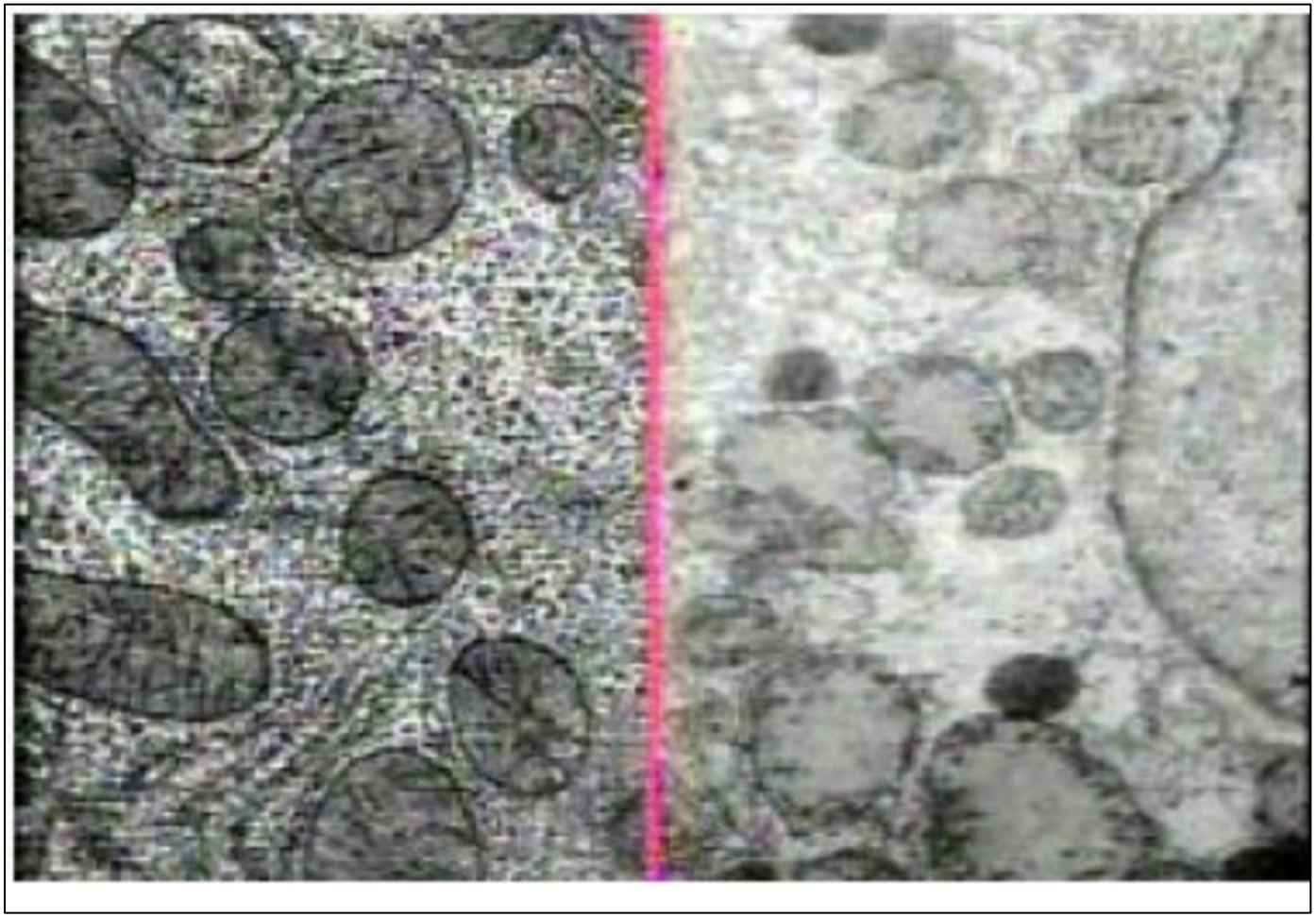
Fatty change of the liver

**Characteristic feature :**

**-Grossly :** Enlarged and pale yellowish liver due to fat accumulation

**-Microscopically :** Signet ring cells (due to peripheral displacement of their nuclei by fat globules)

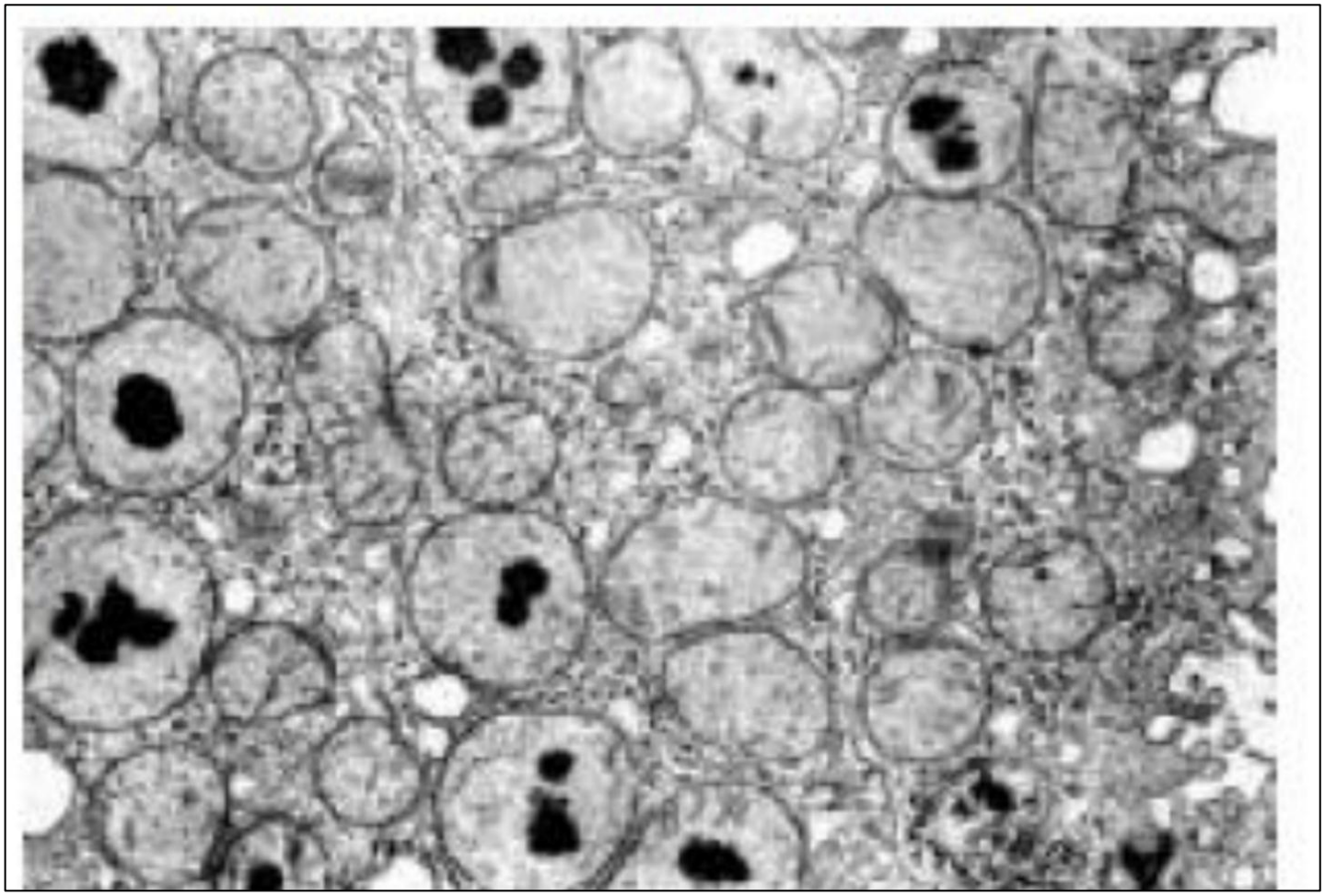
# Reversible cell injury under TEM



**Diagnosis :**

Reversible cell injury

# Irreversible cell injury under TEM



**Diagnosis :**

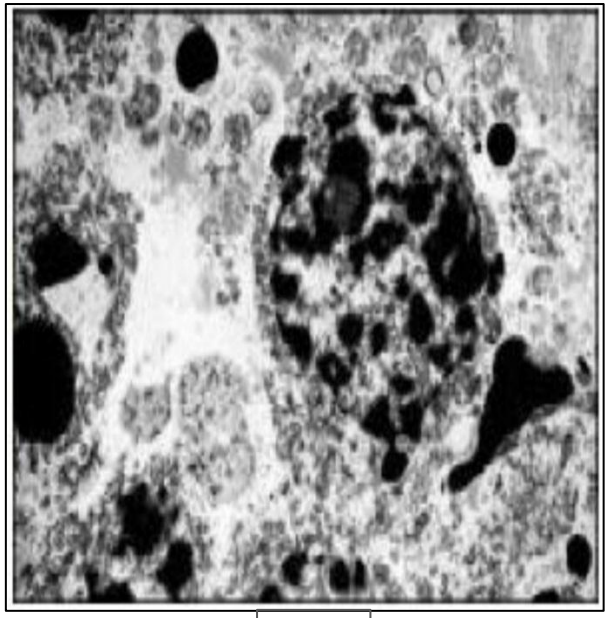
Irreversible cell injury

**Characteristic feature :**

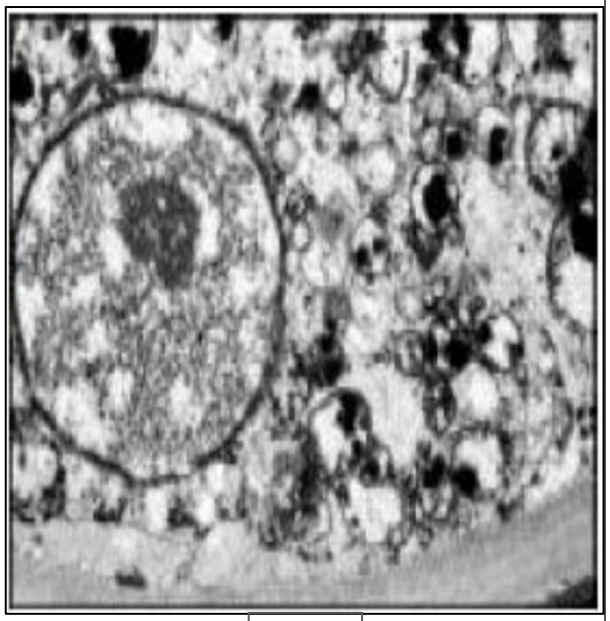
Dense bodies in the mitochondria

# Irreversible cell injury under TEM (nuclear changes)

1



2



3

**Diagnosis :**

Irreversible cell injury

**Characteristic feature :**

**1-Pyknosis** : condensation of DNA

**2-Karyorrhexis** : fragmentation of DNA

**3-Karyolysis** : nuclear lysis and disappearance (soup appearance)

## Coagulative necrosis (in kidney)

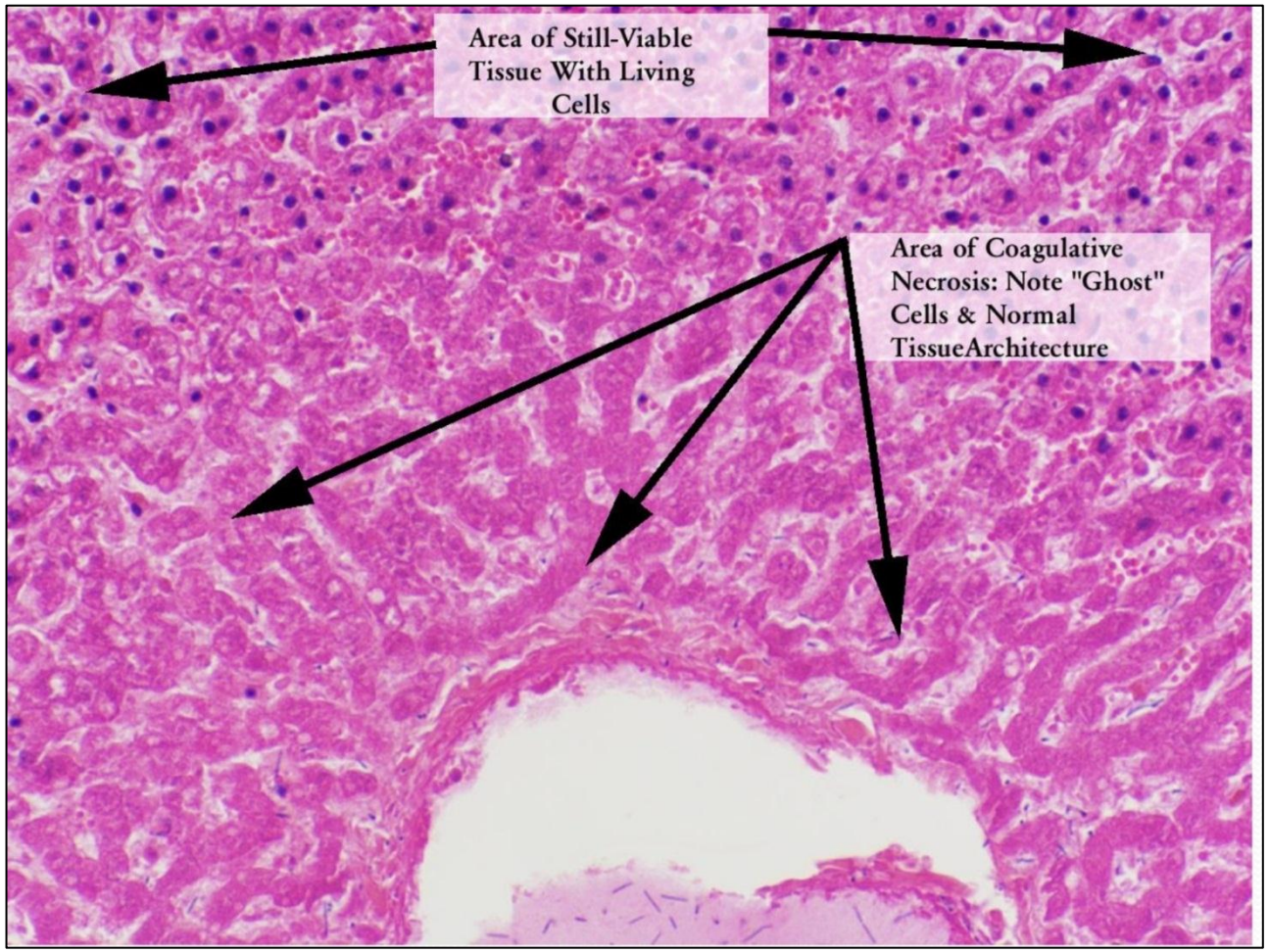
**Diagnosis :**

Coagulative necrosis in the kidney due to infarction

**Characteristic feature :**

Pale wedge-shaped area of infarction with preserved outline

# Coagulative necrosis (in liver)


Area of Still-Viable Tissue With Living Cells
Area of Coagulative Necrosis: Note "Ghost" Cells & Normal TissueArchitecture

**Diagnosis :**

Coagulative necrosis in the liver

**Characteristic feature :**

Dead cells (without nuclei) with preserved outlines called Ghost cells

## Liquefied necrosis (in brain)

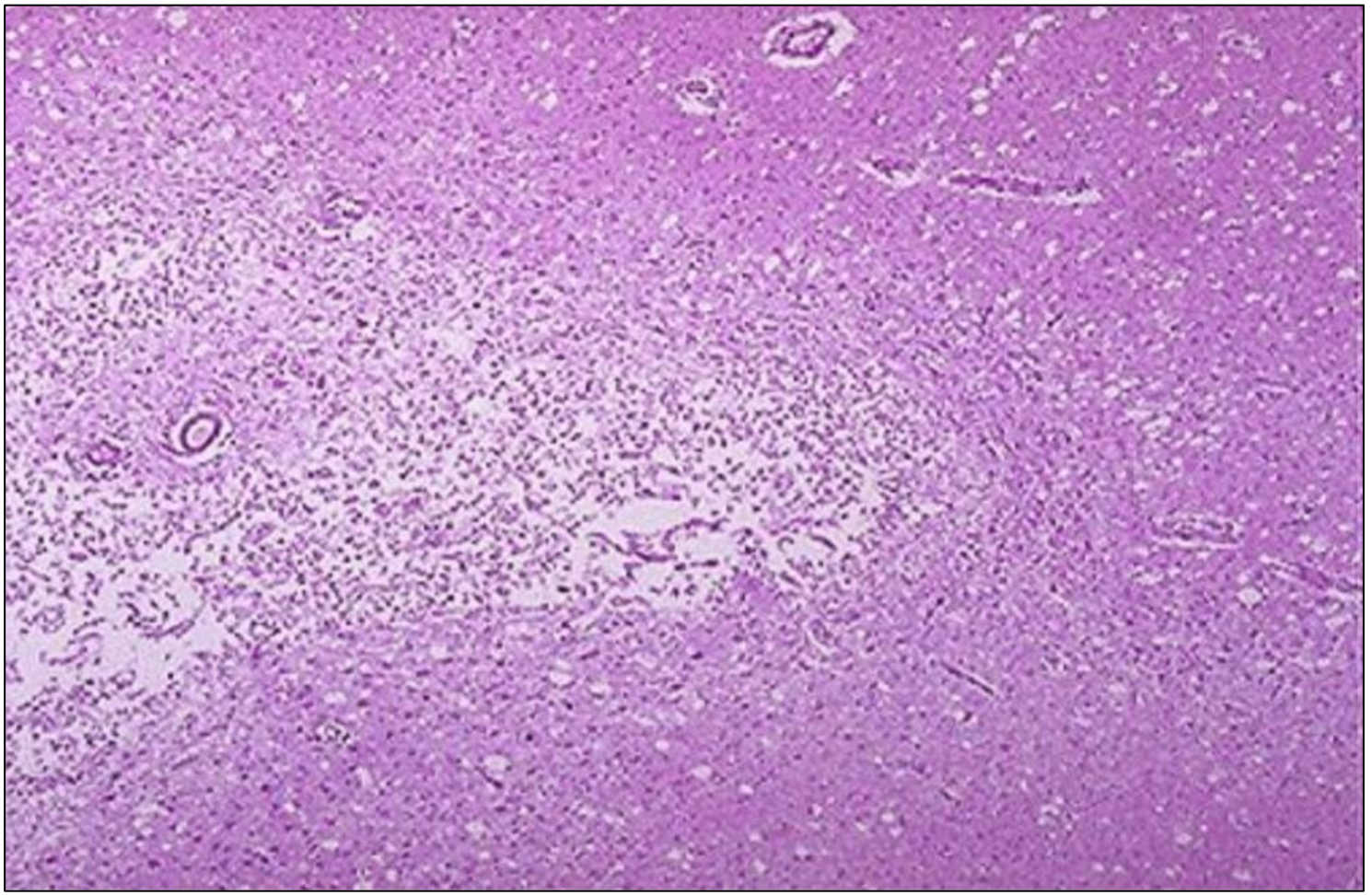
**Diagnosis :**

Liquefied necrosis in the brain

**Characteristic feature :**

Pus-filled sac due to dissolution of the tissue and loss of architecture/outline

## Liquefied necrosis (in brain)



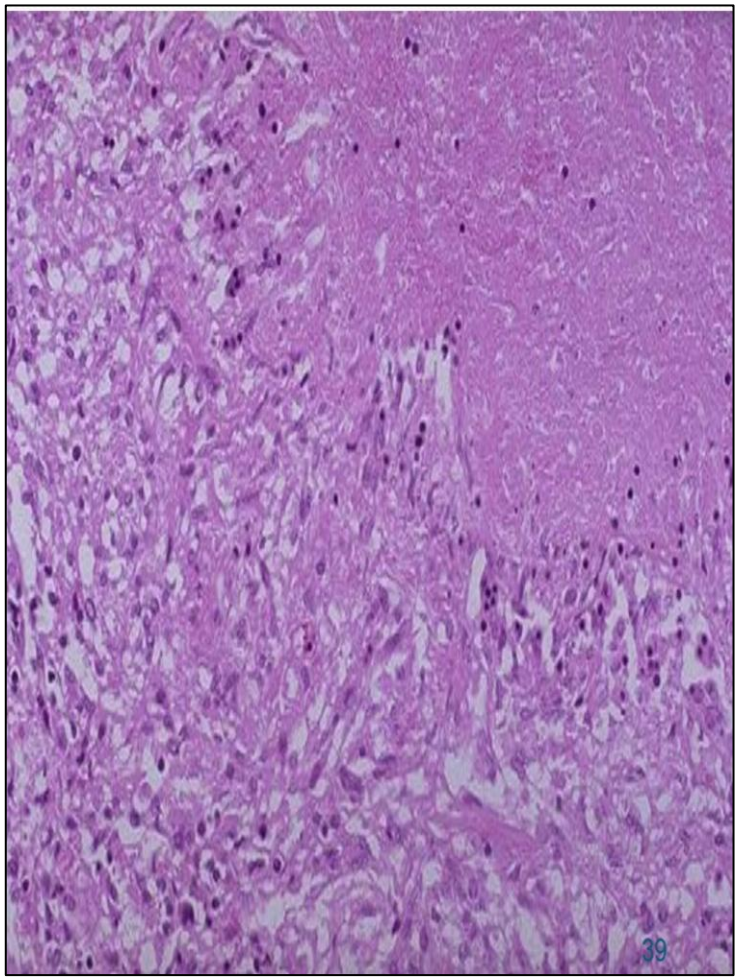
**Diagnosis :**

Liquefied necrosis in the brain

**Characteristic feature :**

Pus-filled sac with surrounding granulation tissue and loss of architecture/outline

# Caseous necrosis (in lung)




**Diagnosis :**

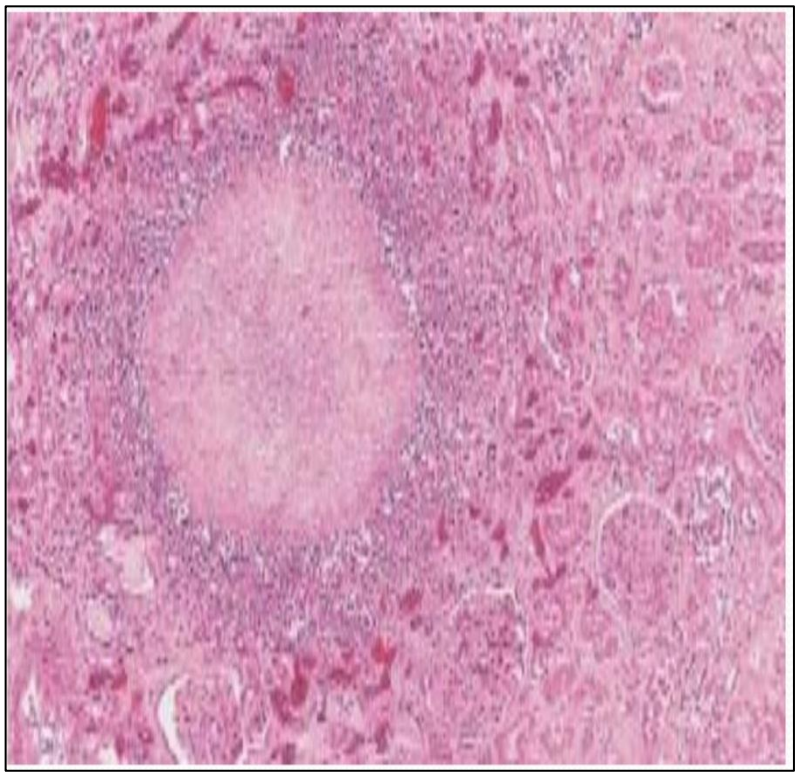
Caseous necrosis in the lung

**Characteristic feature :**

**-Grossly :** Structureless cheese-like appearance

**-Microscopically :** Amorphous eosinophilic granular structureless homogenous material surrounded by granuloma

# Caseous necrosis (in lung)



**Diagnosis :**

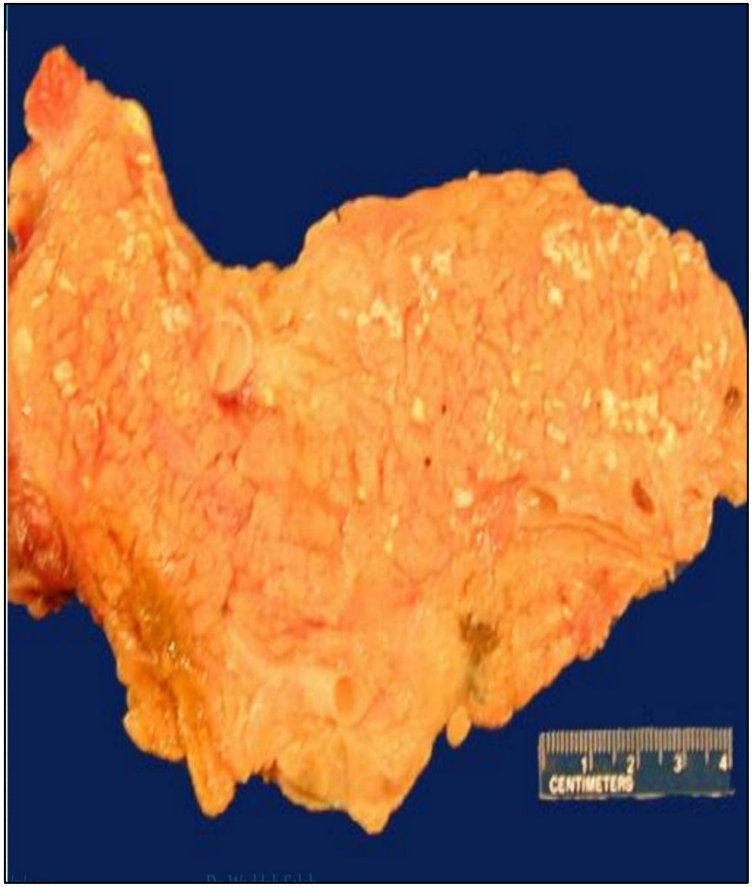
Caseous necrosis in the lung

**Characteristic feature :**

**-Grossly :** Structureless cheese-like appearance

**-Microscopically :** Amorphous eosinophilic granular structureless homogenous material surrounded by granulomatous inflammation

# Fat necrosis (in pancreas)




**Diagnosis :**

Fat necrosis (in case of acute pancreatitis)

**Characteristic feature :**

White chalky appearance

# Fat necrosis

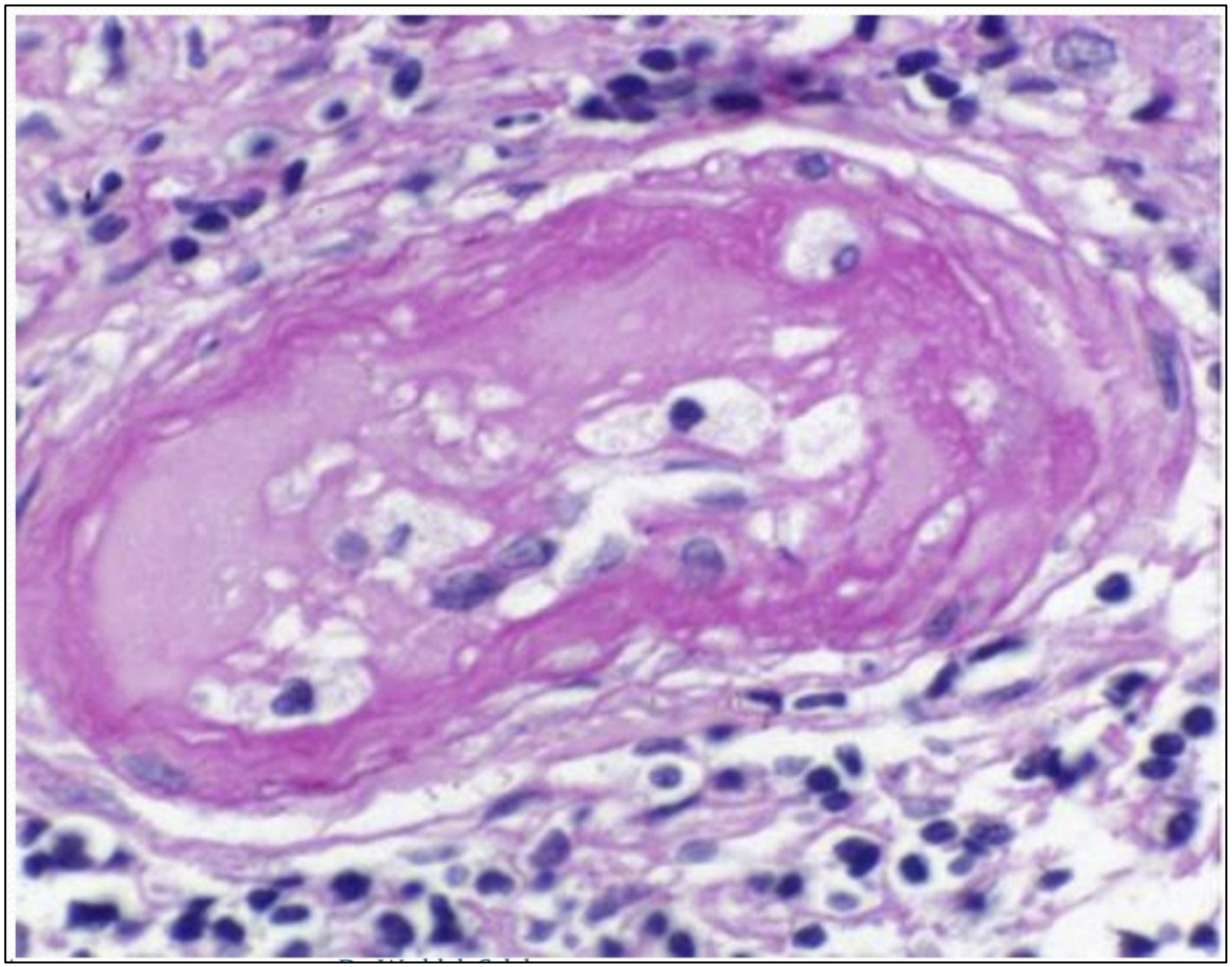
**Diagnosis :**

Fat necrosis

**Characteristic feature :**

Necrotic fat cells filled with fat and calcium deposition ,loss of nuclei and preserved outline

# Fibrinoid necrosis



**Diagnosis :**

Fibrinoid necrosis

**Characteristic feature :**

Fibrin deposition (appears amorphous & eosinophilic) and loss of cells

## Gangrenous necrosis

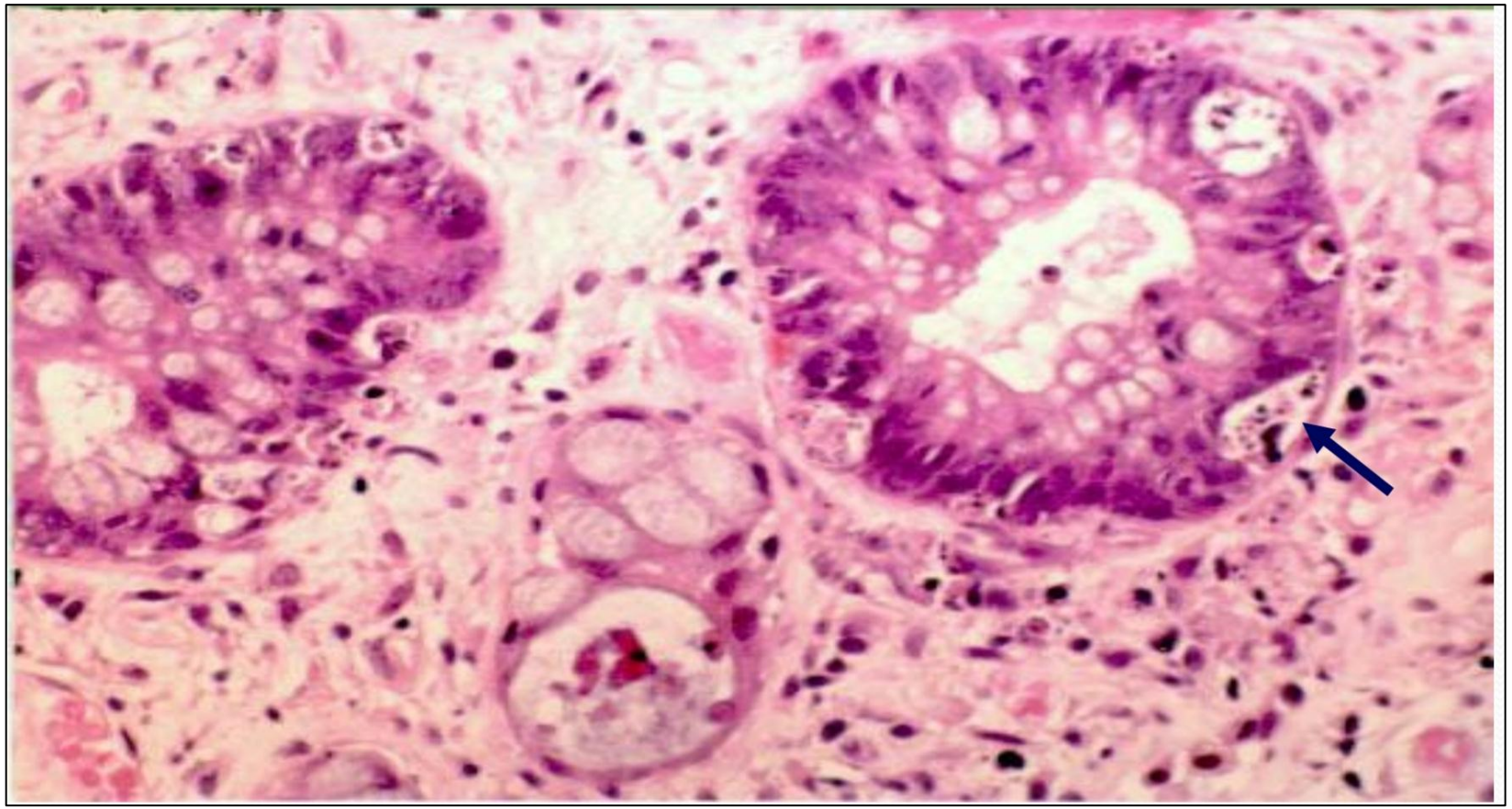
**Diagnosis :**

Gangrenous necrosis

**Characteristic feature :**

Necrosis with putrefaction

# Apoptosis



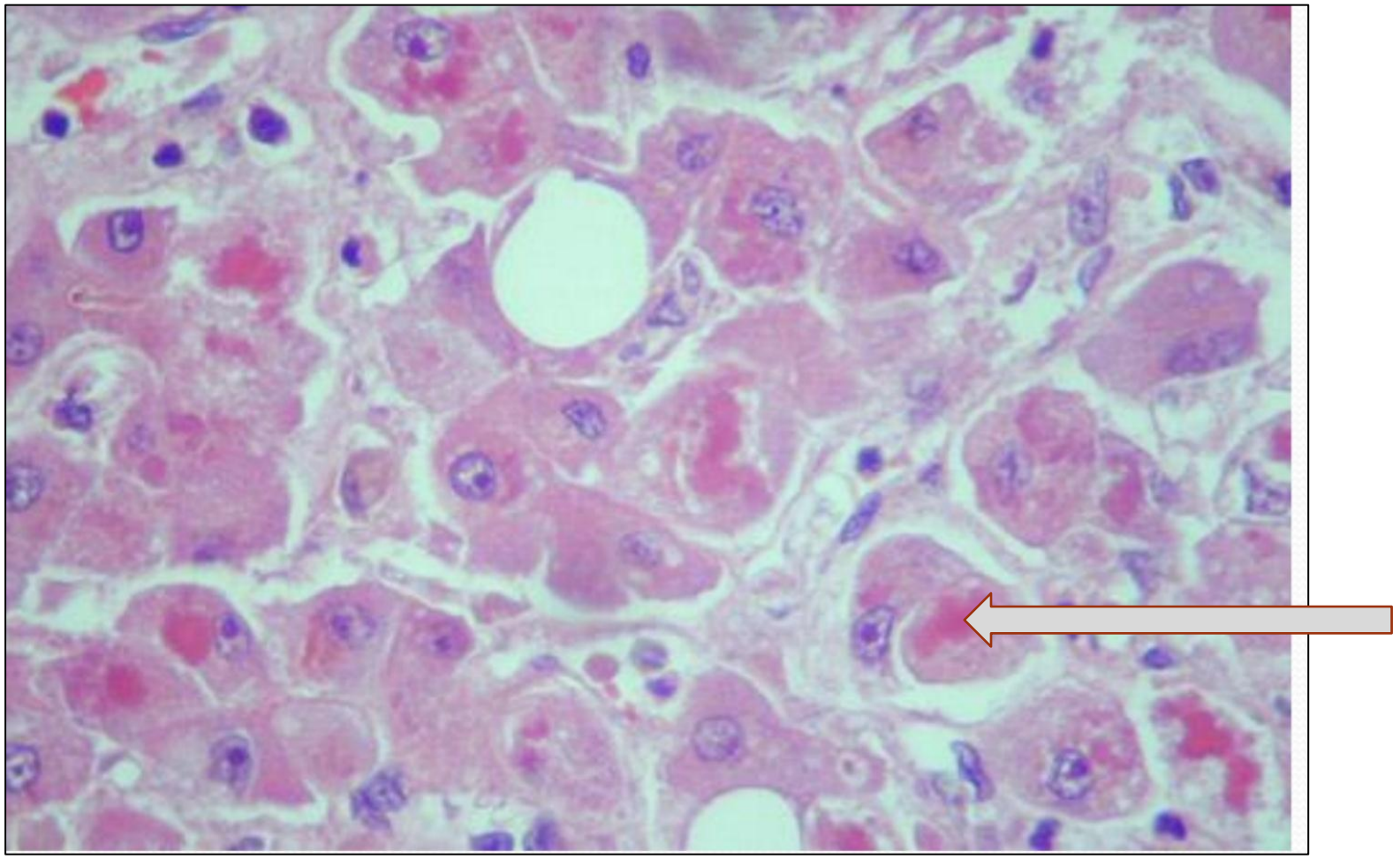
**Diagnosis :**

Apoptosis

**Characteristic feature :**

Individual cell death with fragmentation of the nucleus and with no inflammation

# Alcoholic liver damage



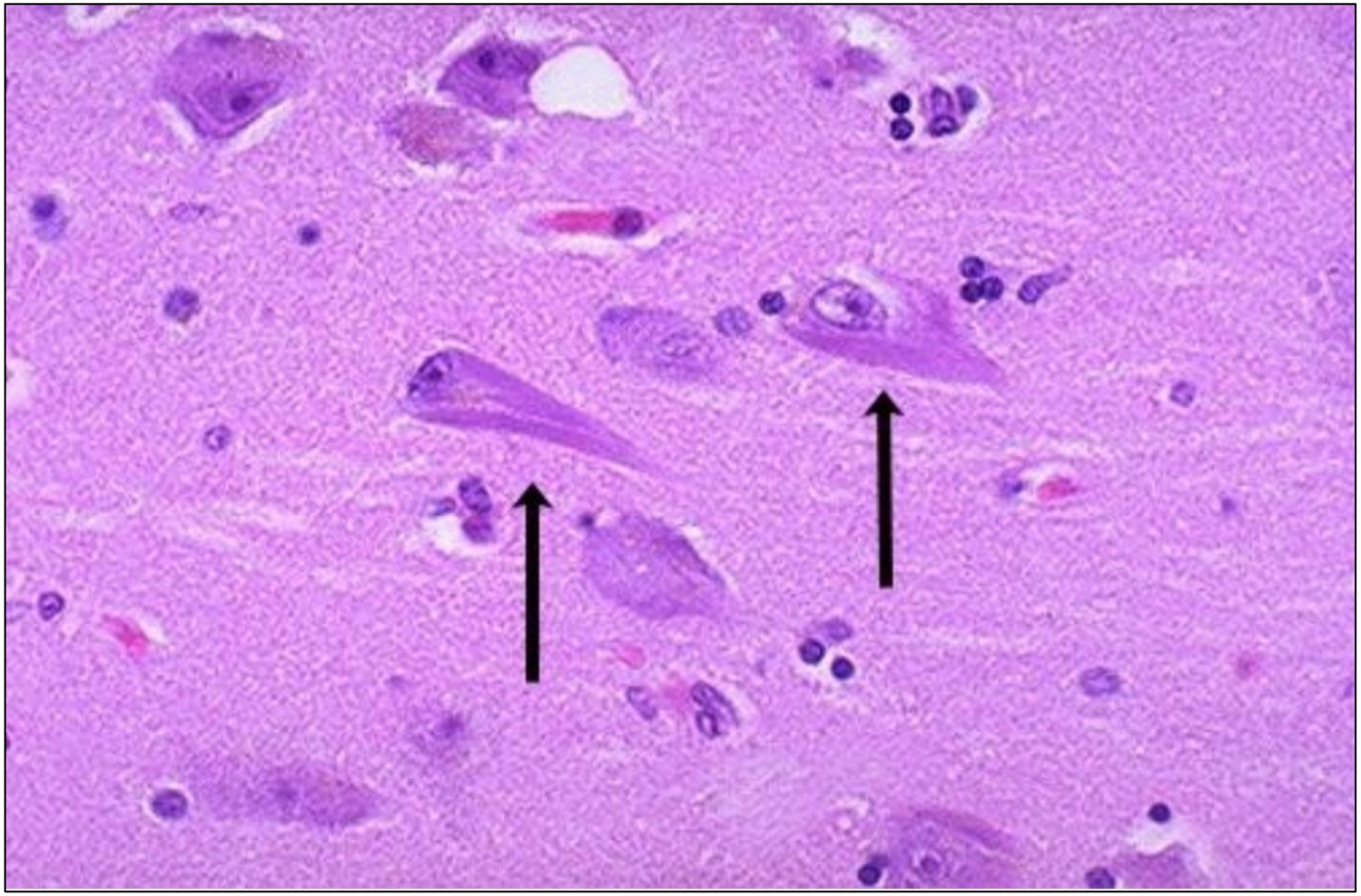
**Diagnosis :**

Alcoholic liver damage

**Characteristic feature :**

Mallory bodies (red globular material)

# Alzheimer's disease



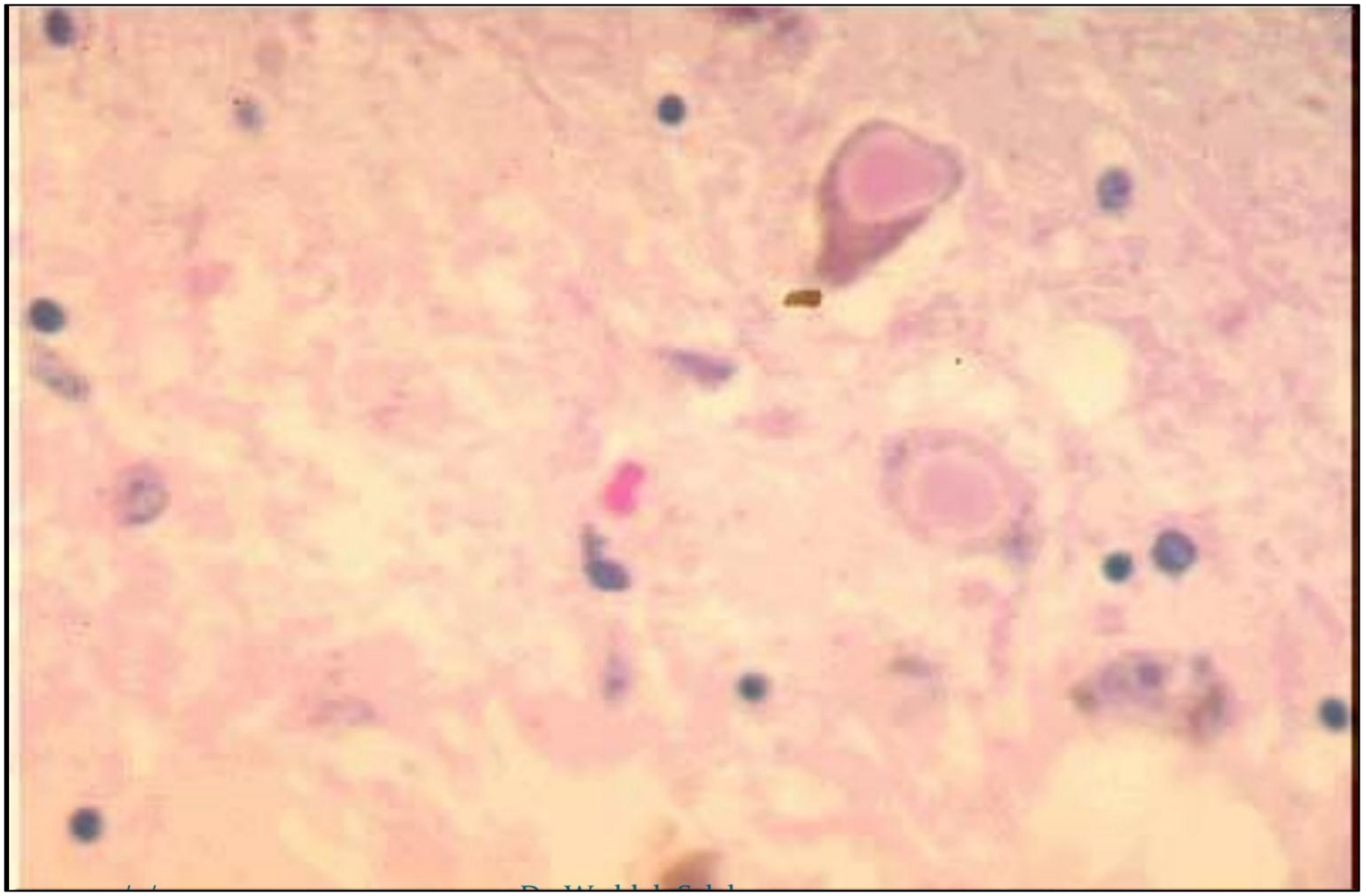
**Diagnosis :**

Alzheimer's disease

**Characteristic feature** :

Pink elongated neurofibrillary tangles

# Demantia



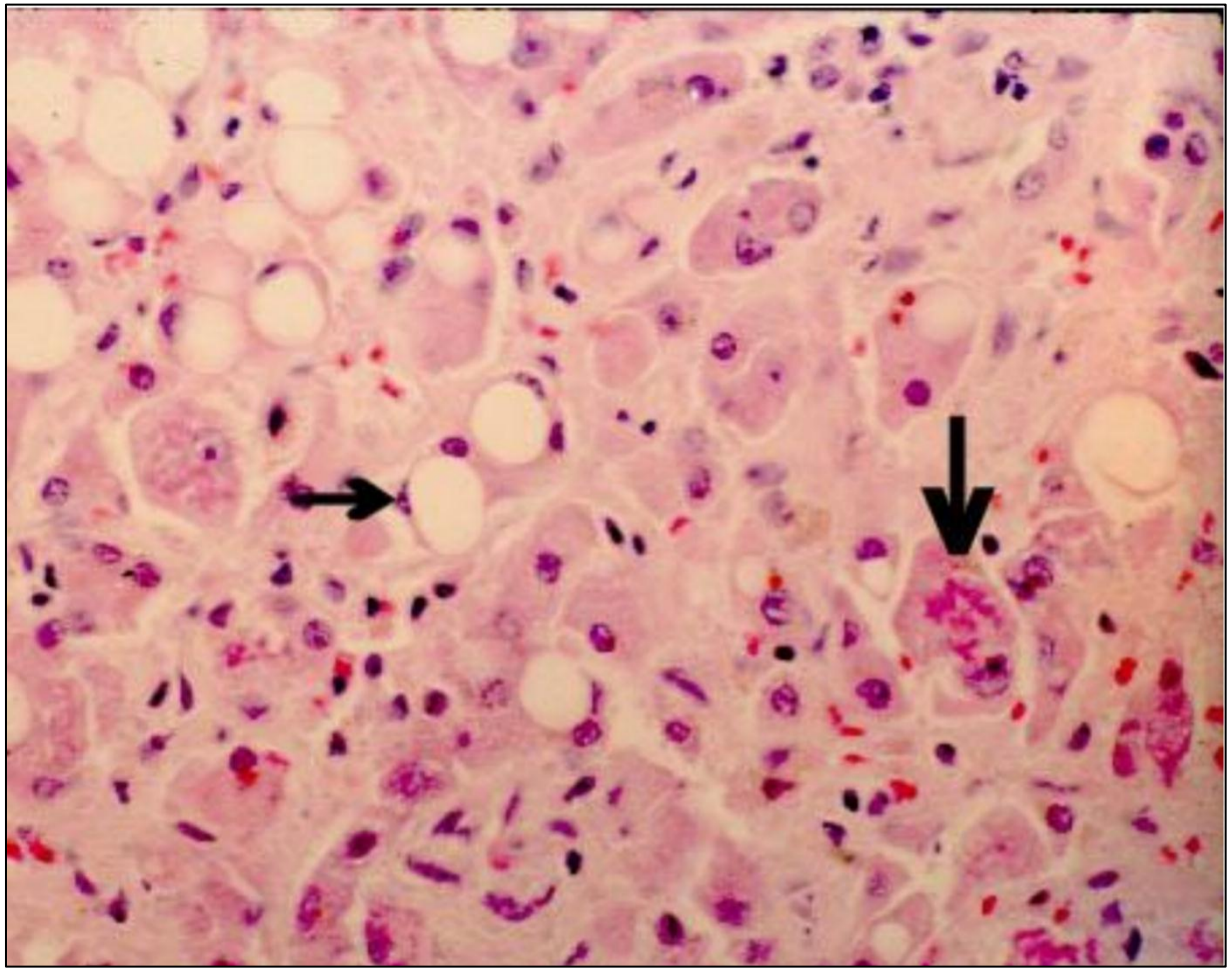
**Diagnosis :**

Damage of neurons (most likely dementia)

**Characteristic feature :**

Lewy bodies (abnormal intracellular eosinophilic material (protein))

# Abnormal accumulation of lipid & protein



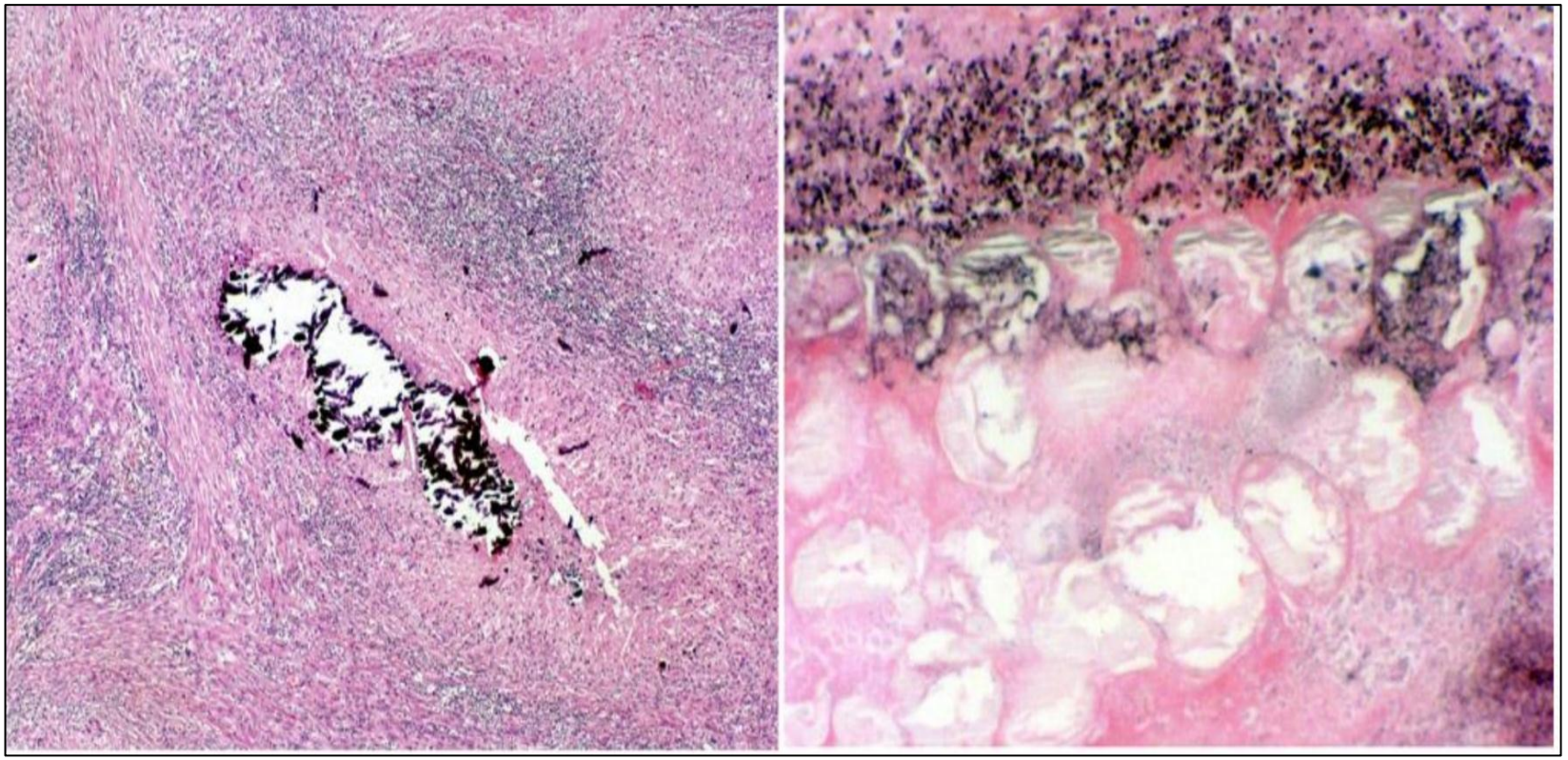
**Diagnosis :**

Accumulation of lipid & protein

**Characteristic feature :**

Cells filled with fat(clear cytoplasm) or protein(eosinophilic material) surrounded by halo area

# Dystrophic calcification



**Diagnosis :**

Dystrophic calcification in caseous necrosis

**Characteristic feature :**

Cheese-like appearance with calcium deposition

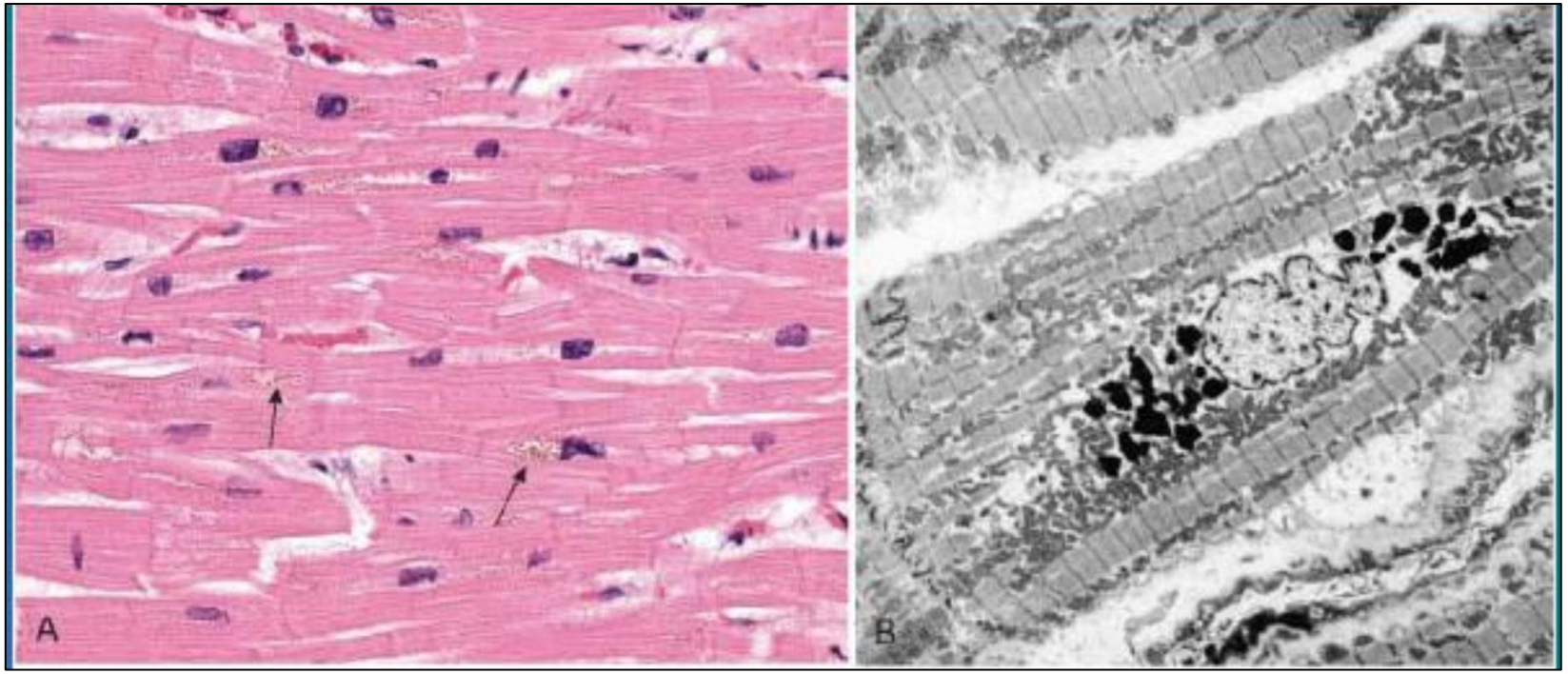
**Diagnosis :**

Dystrophic calcification in fat necrosis

**Characteristic feature :**

White chalky appearance

# Aging & lipofuscin




**Diagnosis :**

Aging of cardiac muscle

**Characteristic feature :**

Lipofuscin pigment

# INFLAMMATION & REPAIR

## Acute inflammation

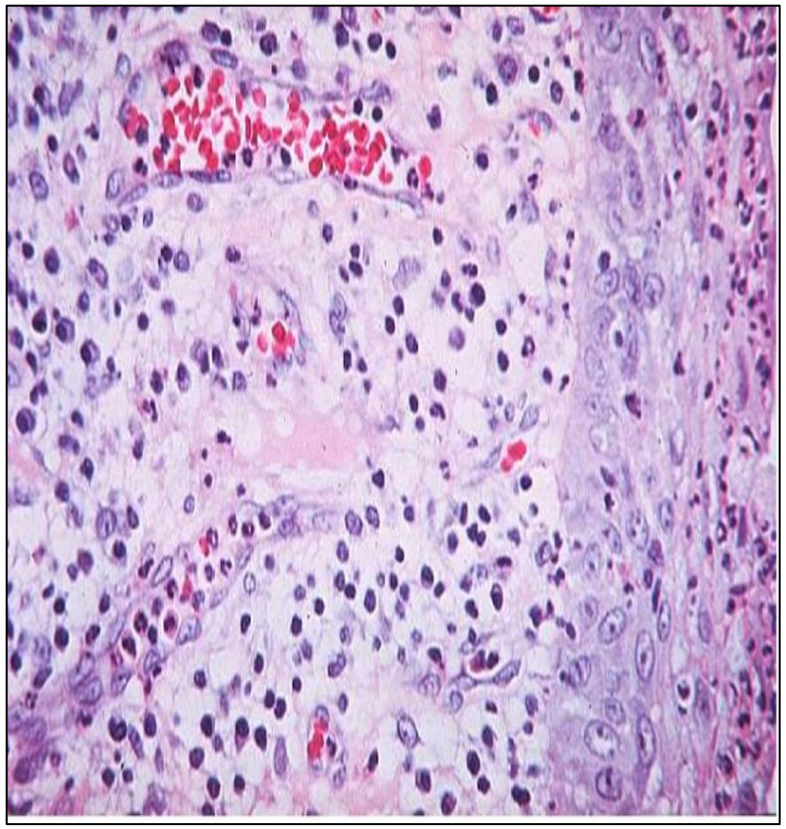
**Diagnosis :**

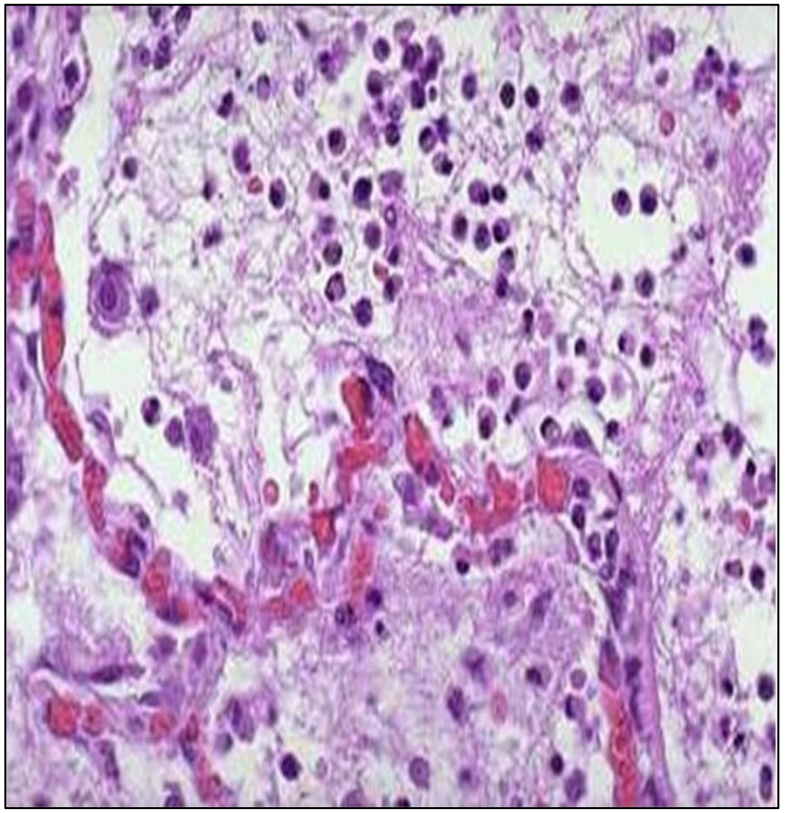
Signs of acute inflammation

**Characteristic feature :**

Redness and swelling

# Acute inflammation





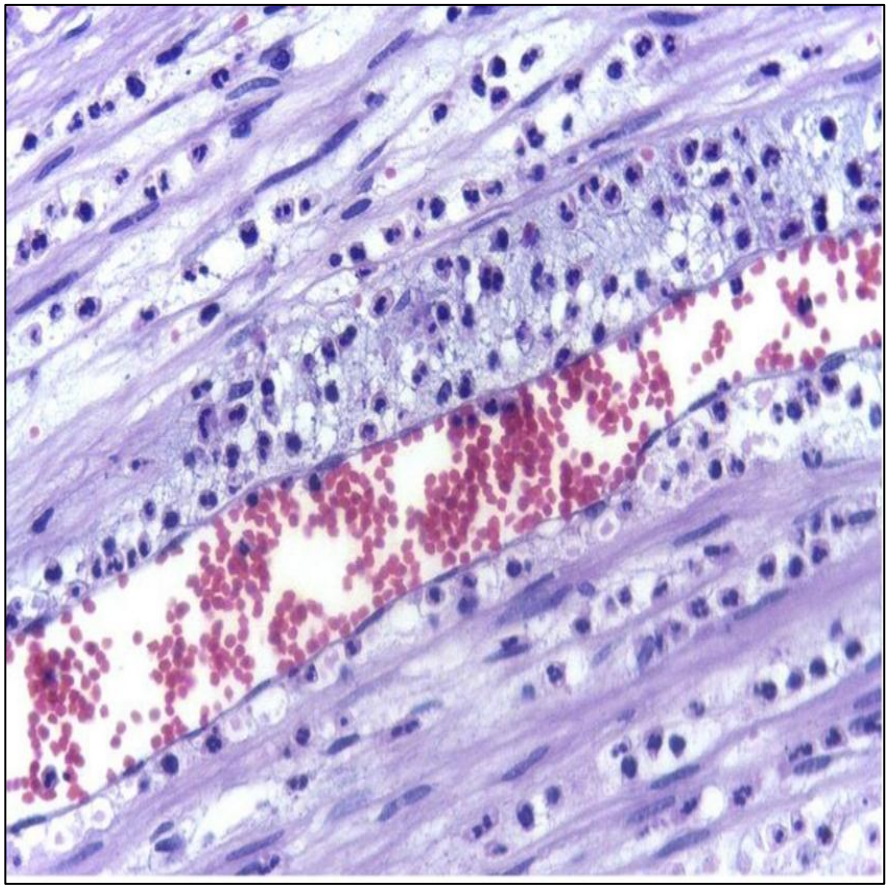
**Diagnosis :**

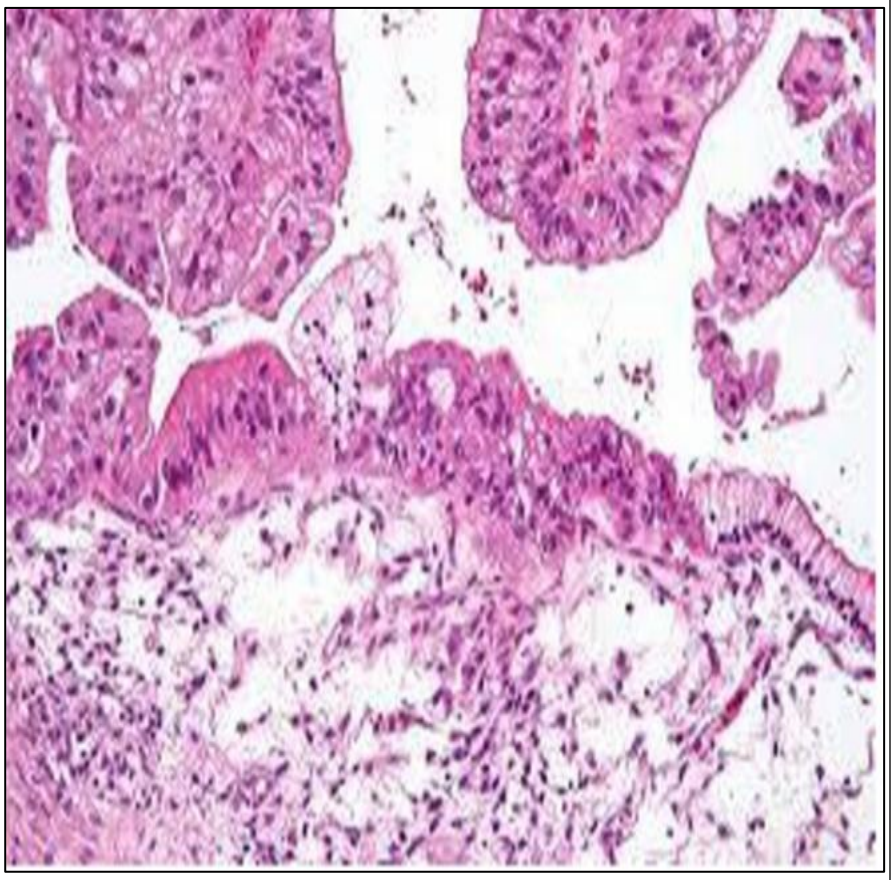
Acute inflammation

**Characteristic feature :**

Neutrophil infiltrate ,congested blood vessels ,edema

# Acute serous inflammation





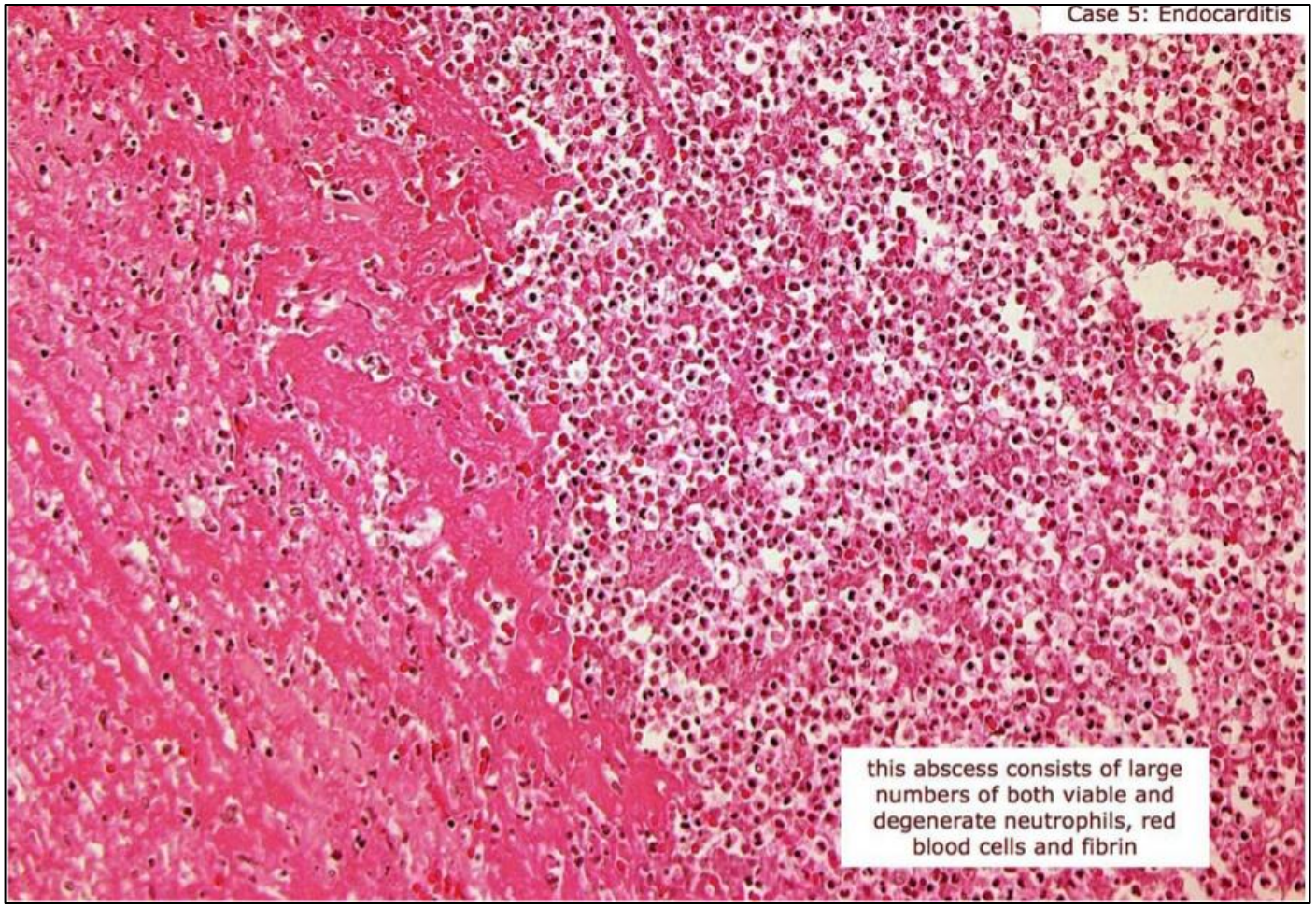
**Diagnosis :**

Acute serous inflammation

**Characteristic feature :**

Neutrophil infiltrate , severe edema , congested blood vessels

# Acute suppurative inflammation


Case 5: Endocarditis
this abscess consists of large numbers of both viable and degenerate neutrophils, red blood cells and fibrin

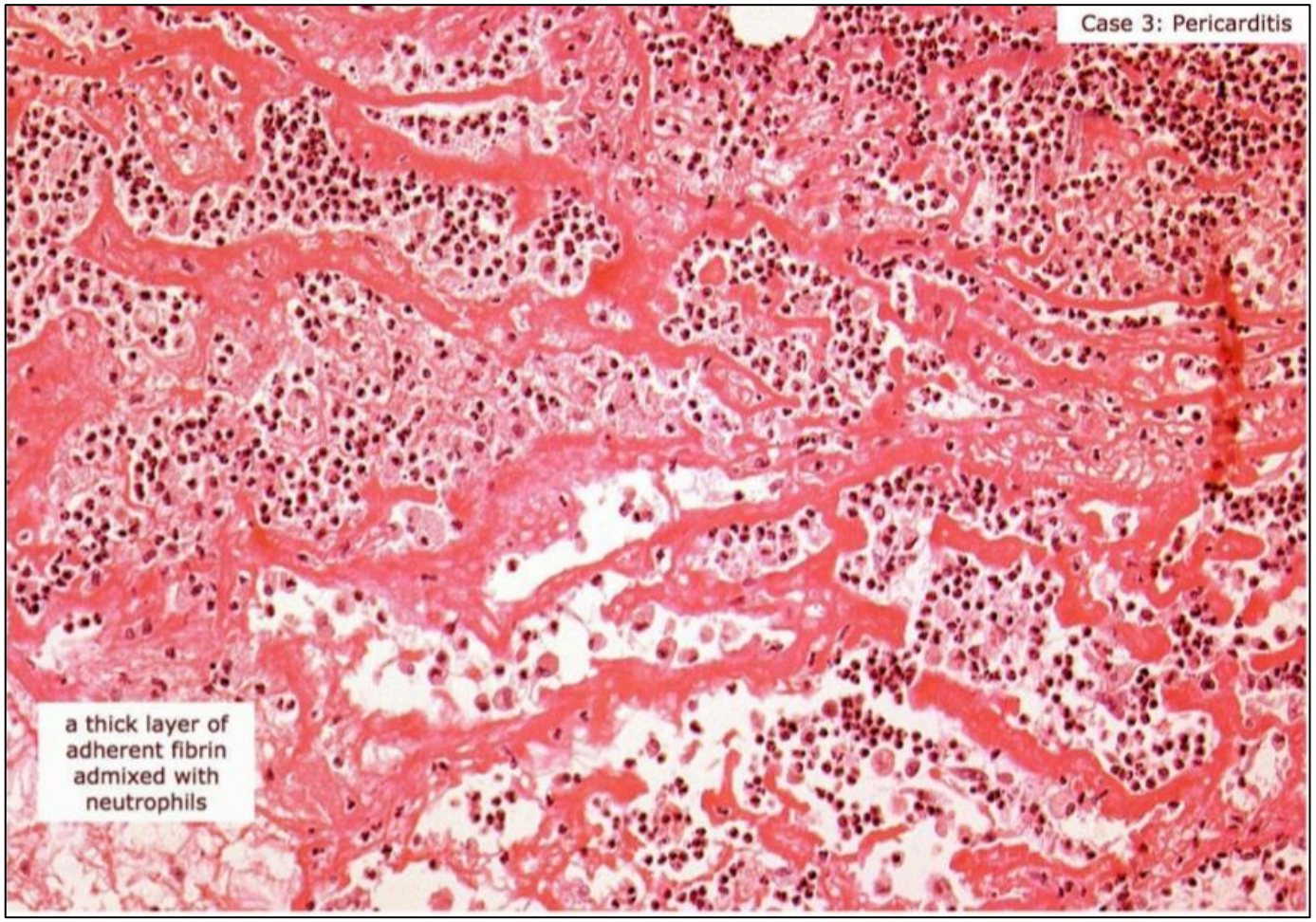
**Diagnosis :**

Acute suppurative inflammation (abscess or pus)

**Characteristic feature :**

Large number of neutrophils , fibrin deposition

# Acute fibrinosuppurative inflammation



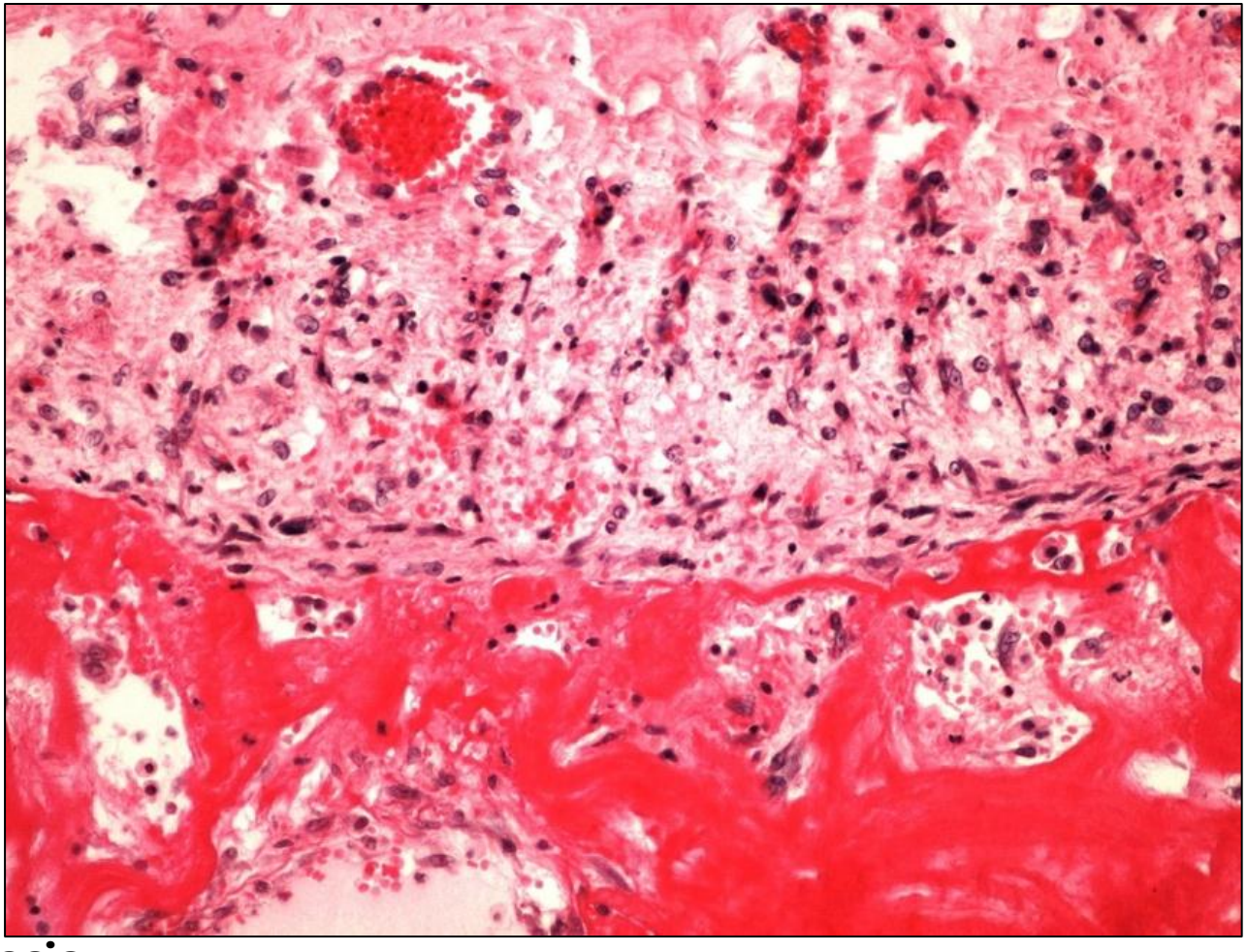

**Diagnosis :**

Acute fibrinosuppurative inflammation

**Characteristic feature :**

Neutrophil infiltrate , fibrin deposition , edema

# Acute serous inflammation



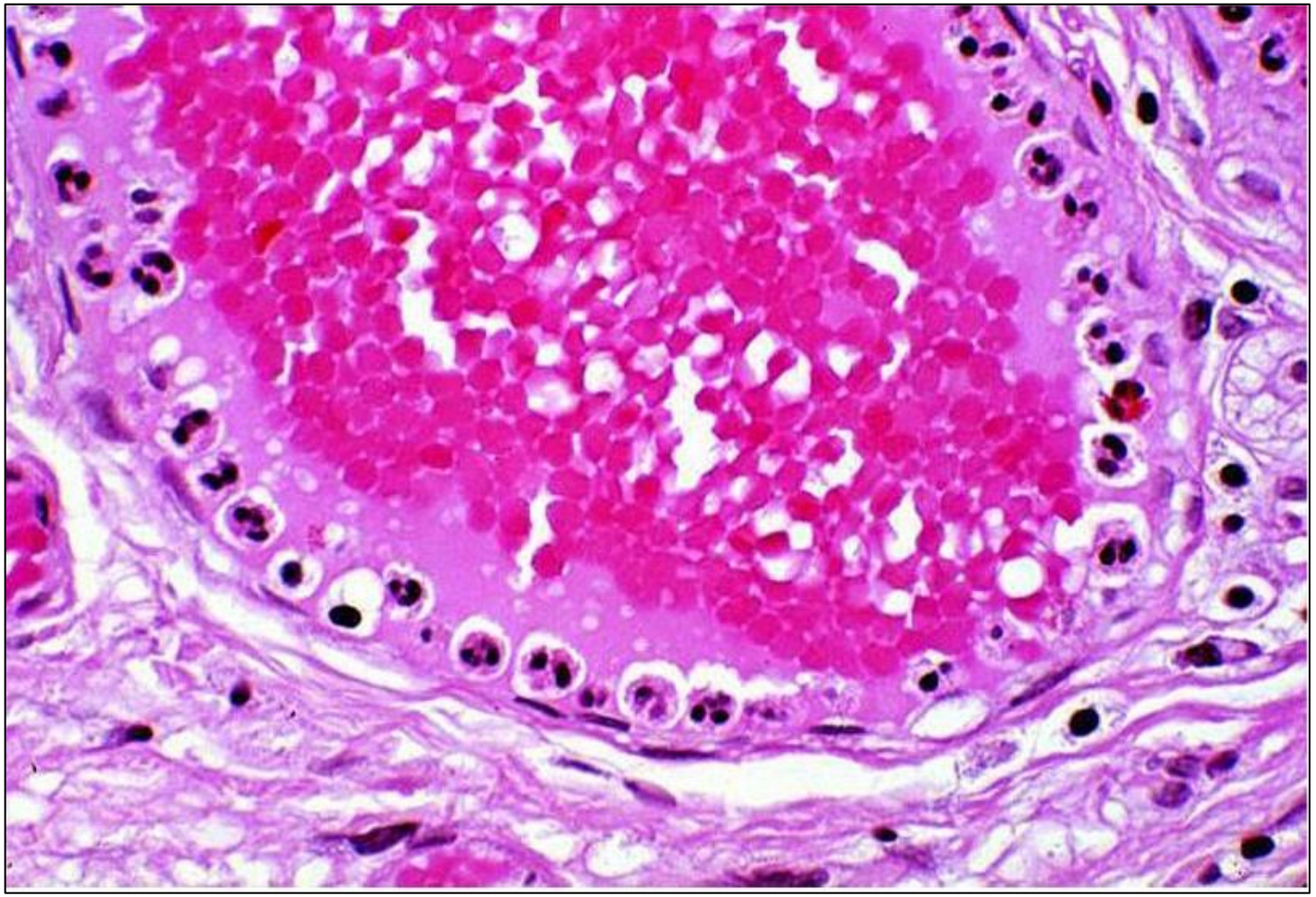
**Diagnosis :**

Acute fibrinoid inflammation

**Characteristic feature :**

Prominent fibrin deposition , neutrophil infiltrate , edema , congested blood capillaries

# Acute inflammation



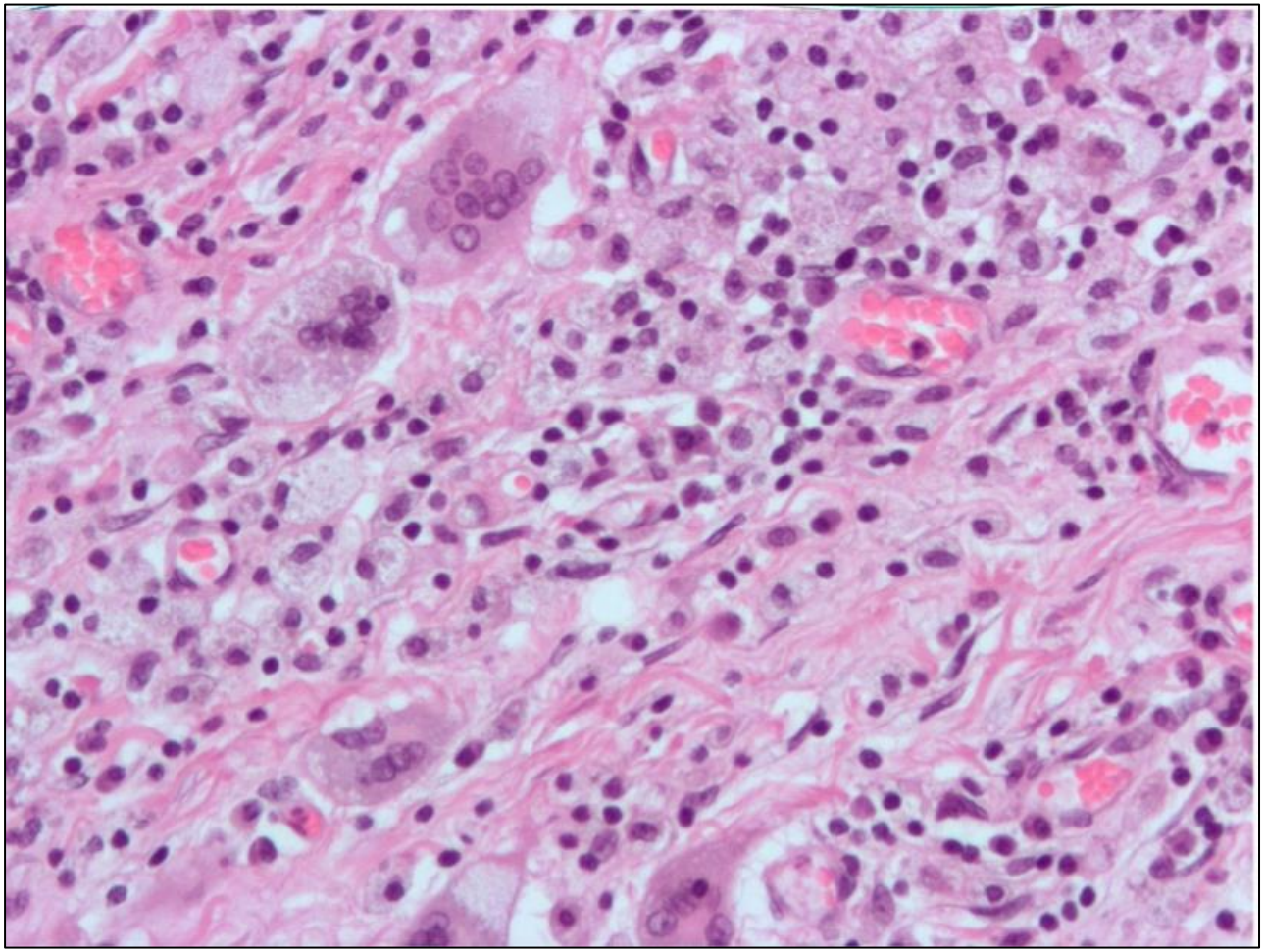
**Diagnosis :**

Migration of leukocytes during the acute inflammation

**Characteristic feature :**

Migrating neutrophils at the periphery of the blood vessel

## Non-specific chronic inflammation



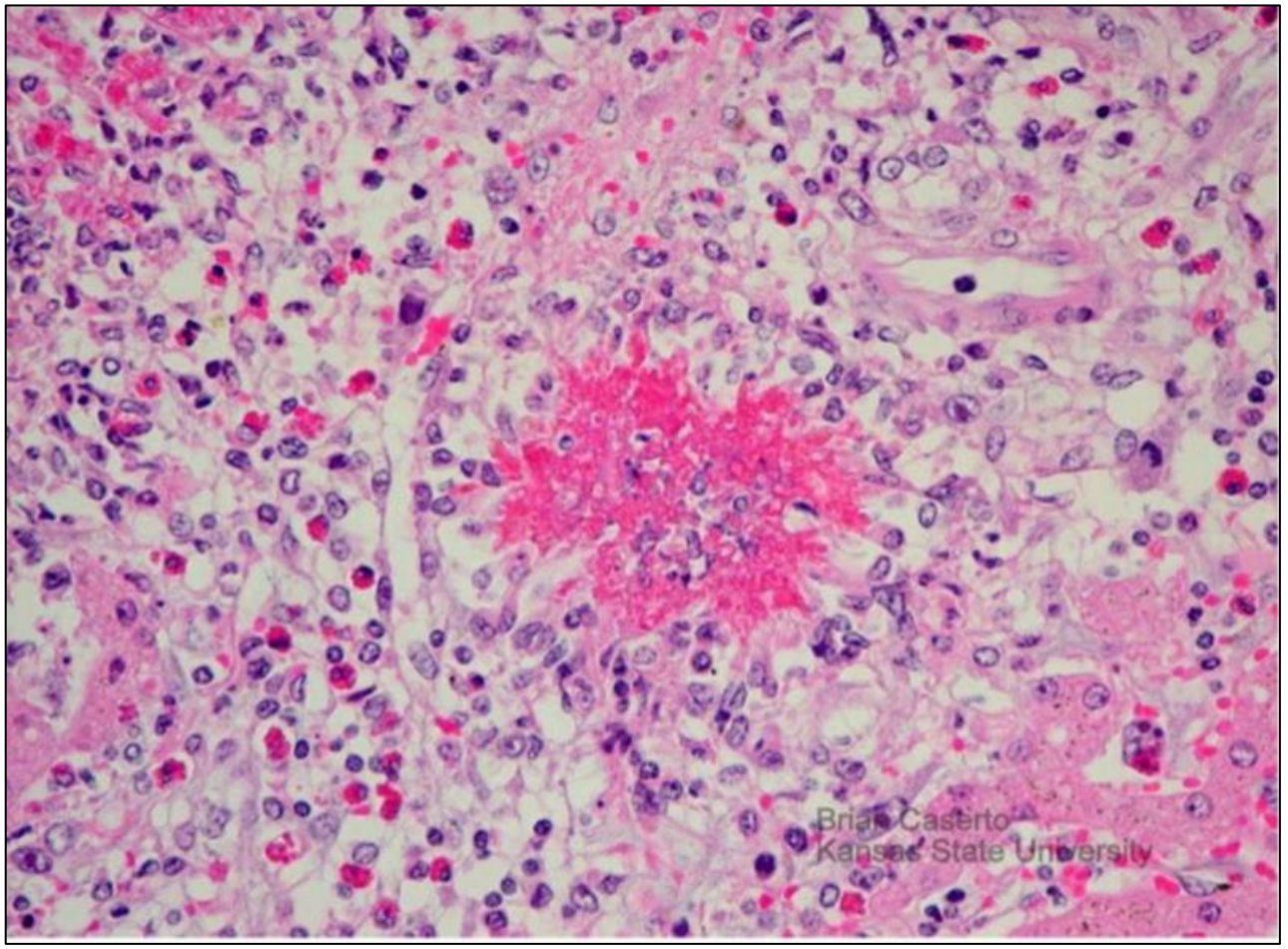
**Diagnosis :**

Non-specific chronic inflammation

**Characteristic feature :**

Inflammatory infiltrate of lymphocytes ,plasma cells ,and macrophage (in form of giant cell)

## Specific chronic inflammation



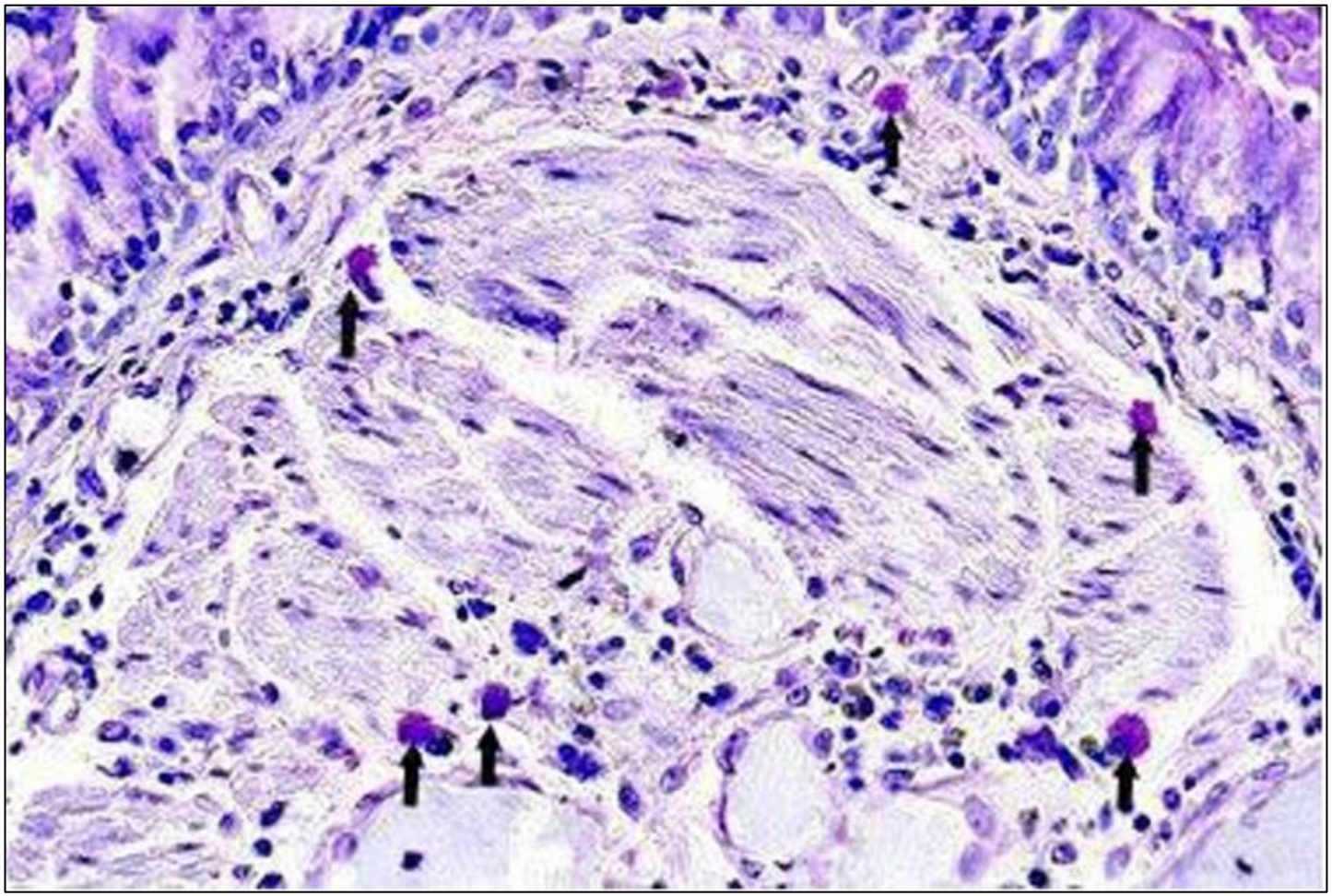

**Diagnosis :**

Specific chronic inflammation(may be due to allergy or parasitic infection)

**Characteristic feature :**

Inflammatory infiltrate of eosinophils (mainly),lymphocytes ,and macrophage (in the form of giant cell)

## Specific chronic inflammation



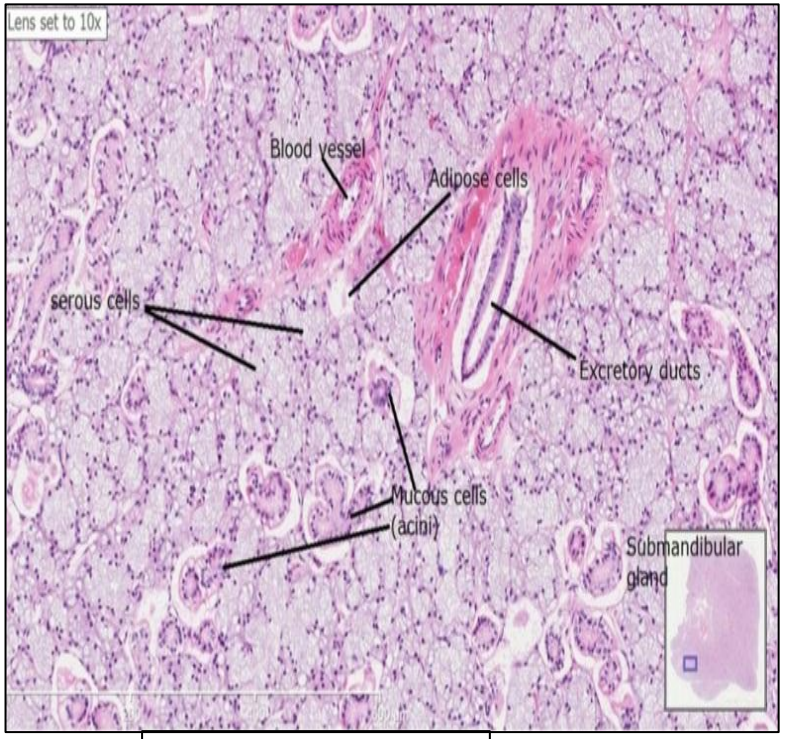
**Diagnosis :**

Specific chronic inflammation(may be due to allergy )

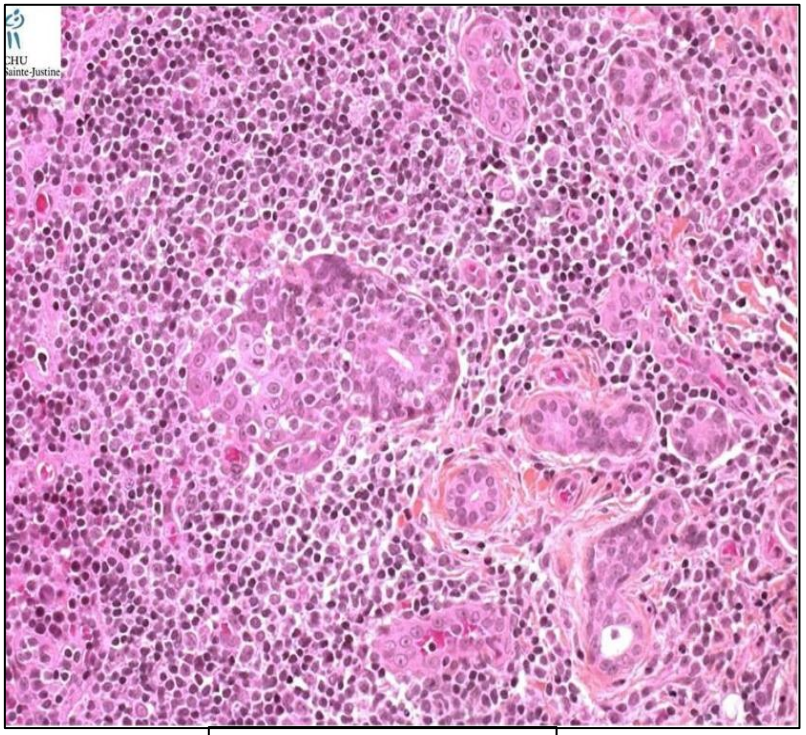
**Characteristic feature :**

Inflammatory infiltrate of basophils (mainly),lymphocytes ,and macrophage (in the form of giant cell)

# Specific chronic inflammation




Normal tissue of salivary gland



Chronic Inflammation in of salivary gland

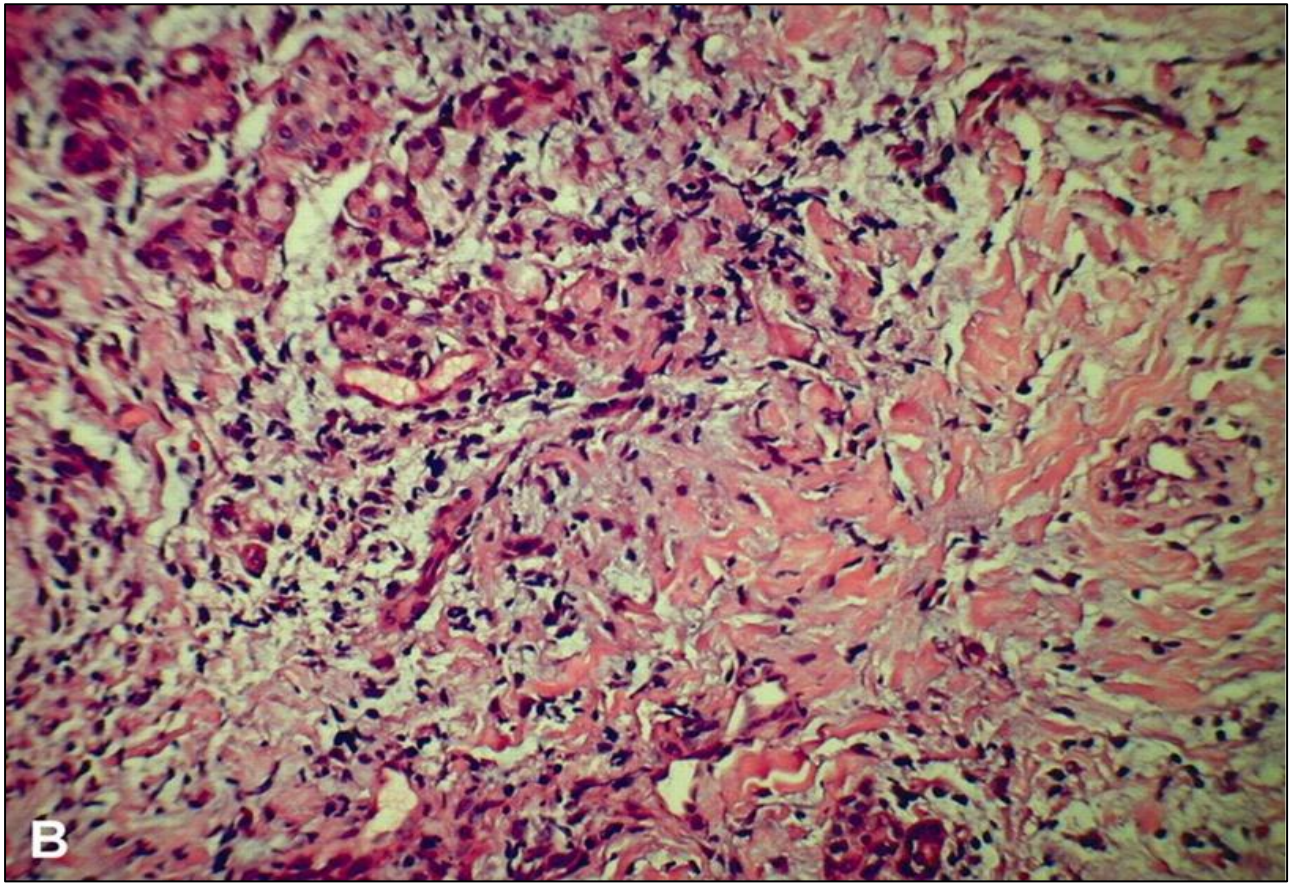
**Diagnosis :**

Chronic inflammation in the salivary gland (early stage)

**Characteristic feature :**

Mononuclear infiltrate (mainly lymphocytes) , tissue destruction

# Chronic inflammation



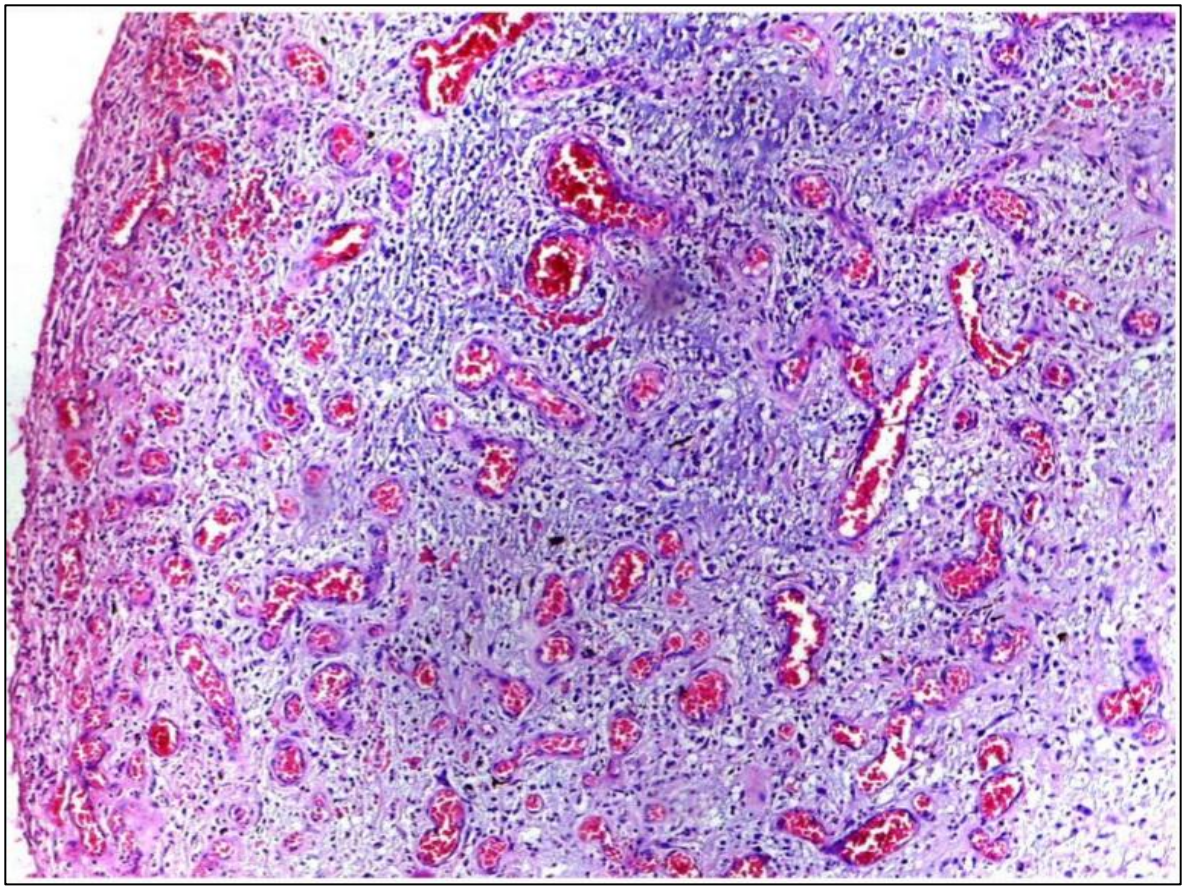

**Diagnosis :**

Chronic inflammation in the salivary gland (late stage)

**Characteristic feature :**

Fibrous tissue formation(collagen bundles & fibroblasts)

# Chronic inflammation



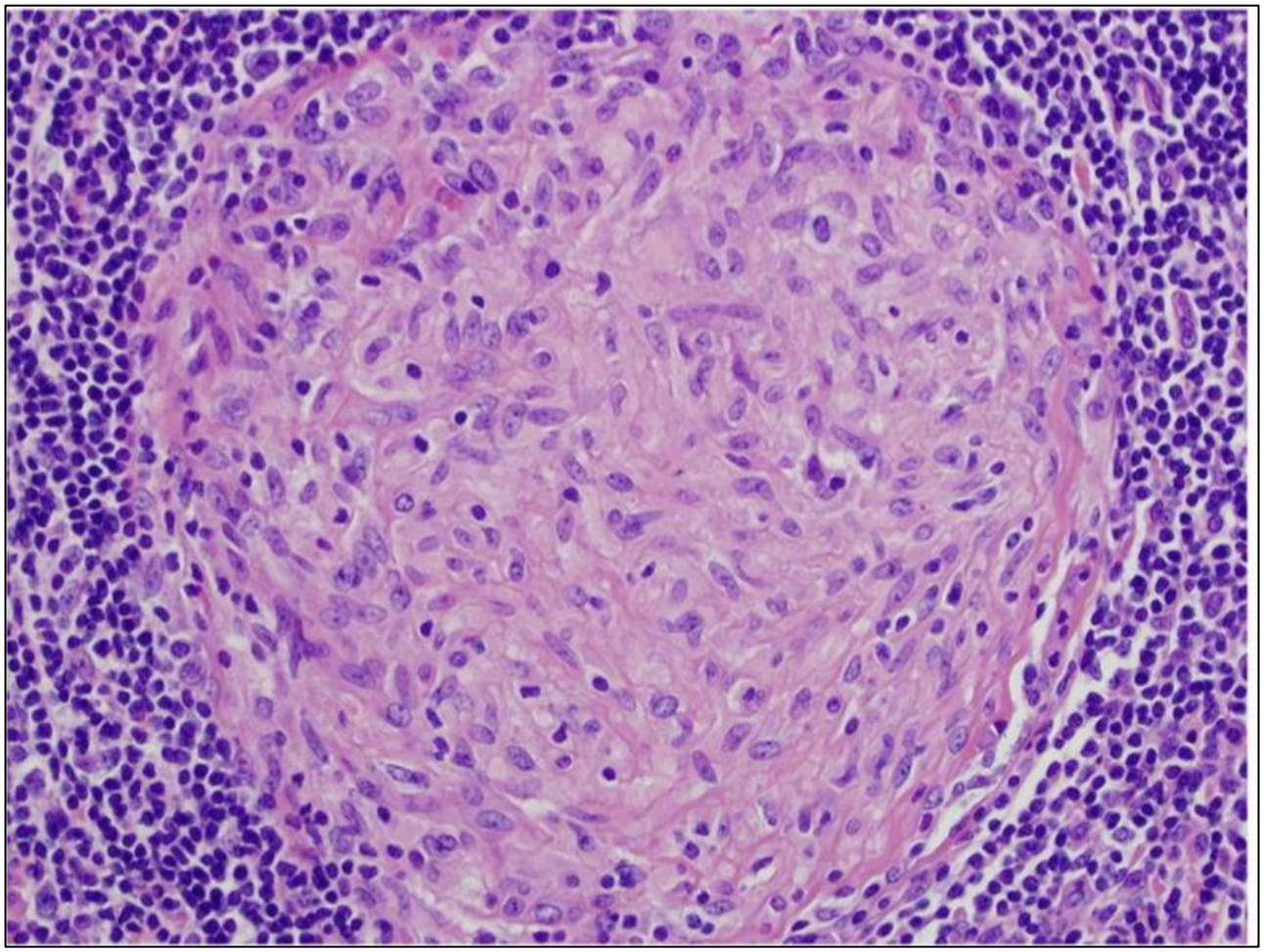
**Diagnosis :**

Chronic inflammation in the salivary gland (late stage)

**Characteristic feature :**

Granulation tissue formation

# Chronic inflammation



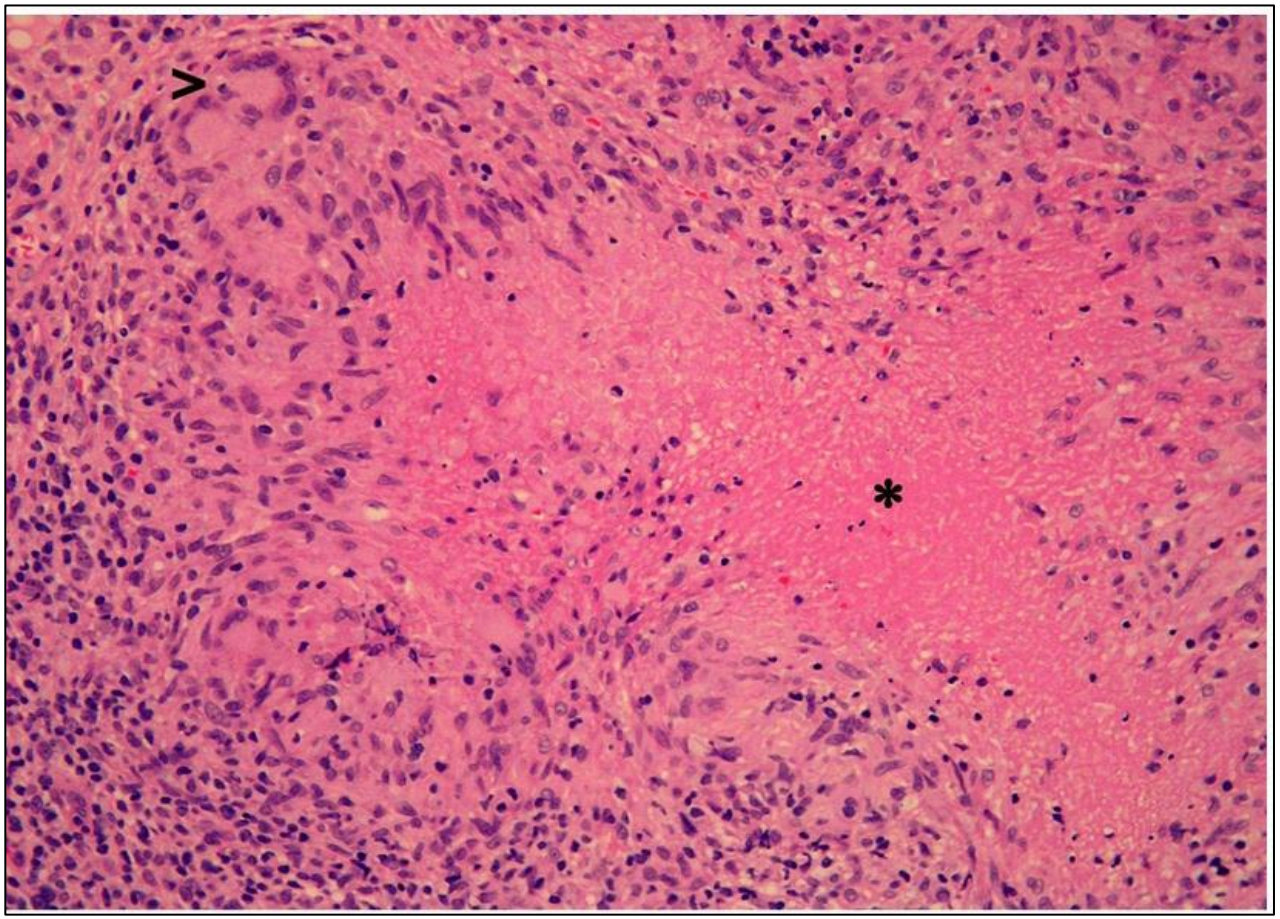
**Diagnosis :**

Specific non-caseating chronic inflammation (non-caseating granuloma)

**Characteristic feature :**

Granuloma with accumulation of multinuclear giant cells ,epitheloid cells and lymphocytes

## Specific caseating chronic inflammation



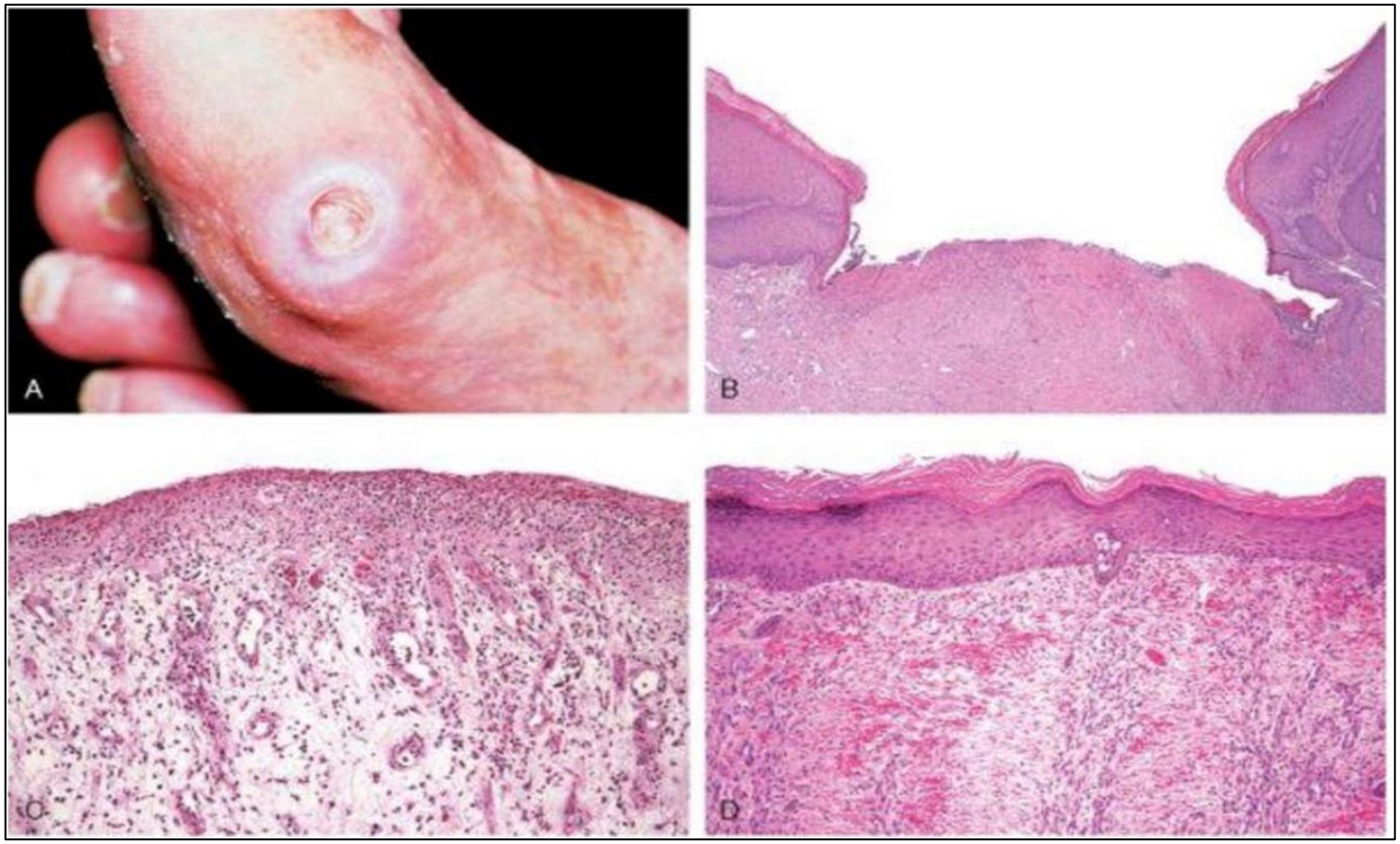

**Diagnosis :**

Specific caseating chronic inflammation (caseating granuloma)

**Characteristic feature :**

Caseous necrosis , granuloma with mononuclear cell and lymphocyte infiltrate

## Skin ulcer




**Diagnosis :**

Skin ulceration

**Characteristic feature :**

A-Gross picture of the ulcer

B-Tissue necrosis

C-Granulation tissue

D-Fibrosis

## Scar formation

**Diagnosis :**

Scar formation

**Characteristic feature :**

Line of healing is due to collagen formation

## Scar formation

**Diagnosis :**

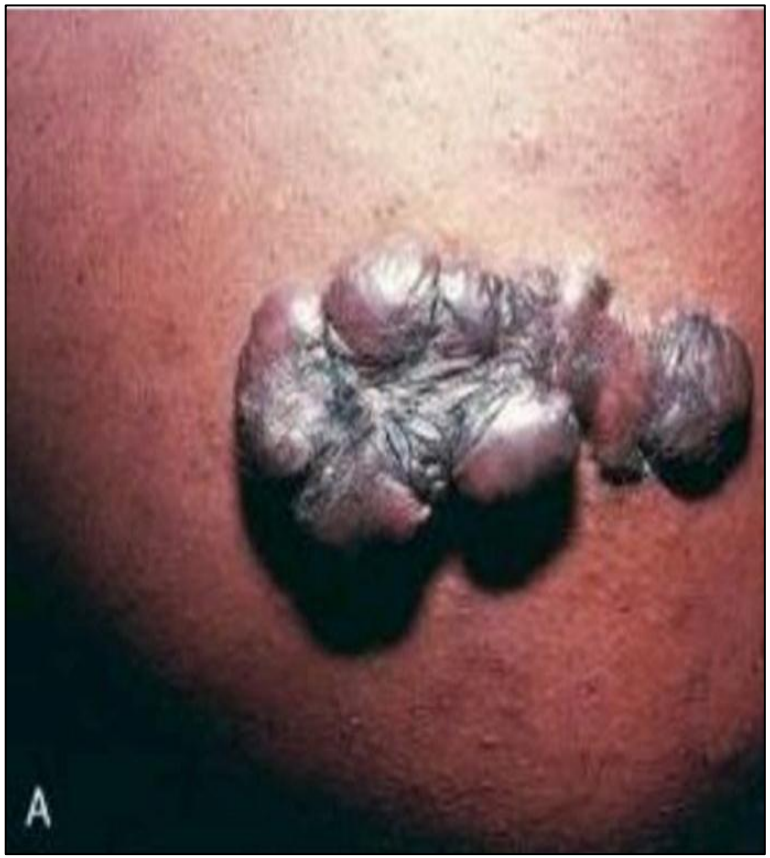
Scar formation in the heart after MI

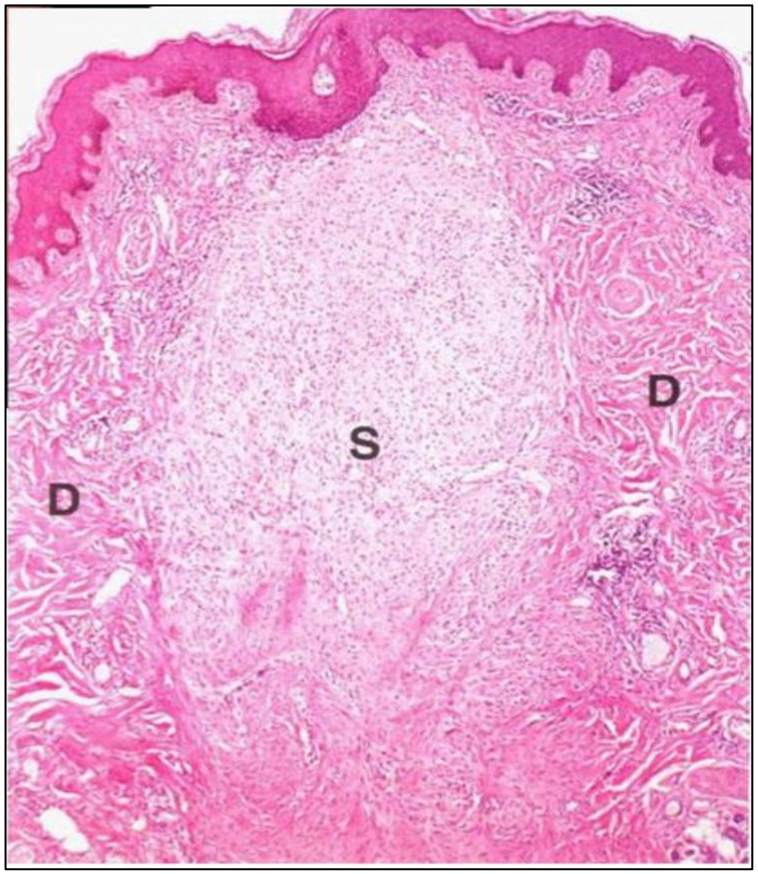
**Characteristic feature :**

**-Grossly :** white fibrous tissue

**-Microscopically :** fibrous tissue formation , collagen bundles , fibroblasts

# Keloid




**Diagnosis :**

Keloid (excessive scar formation)

**Characteristic feature :**

**-Grossly :** large scar extending beyond the edge of the wound

**-Microscopically :** excessive collagen bundles formation (the pale area)

## Scar contracture

**Diagnosis :**

Scar contracture

**Characteristic feature :**

Excessive contracture of the formed fibrous tissue

## Liver cirrhosis

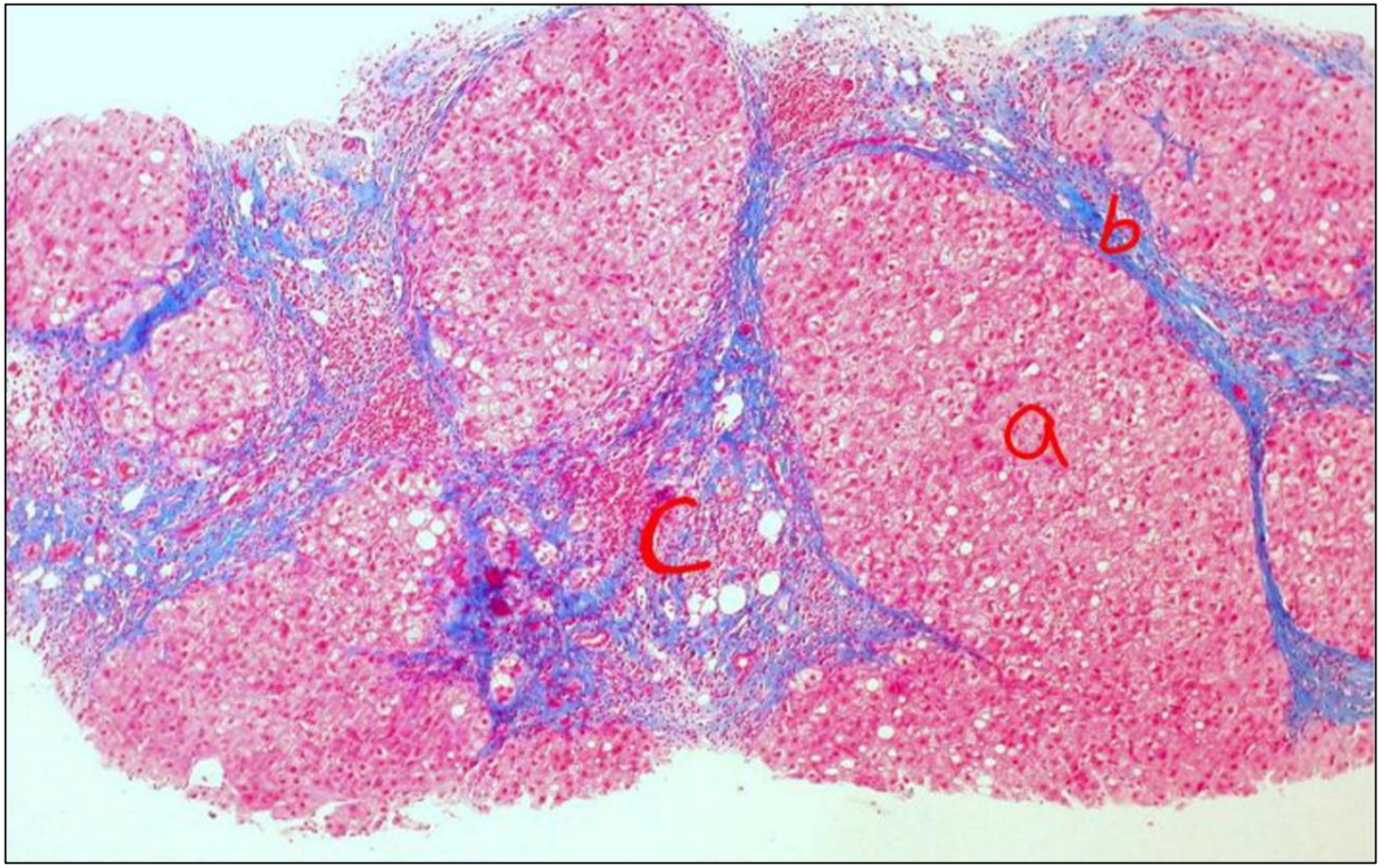
**Diagnosis :**

Liver cirrhosis

**Characteristic feature :**

Presence of regenerative nodules

## Liver cirrhosis




**Diagnosis :**

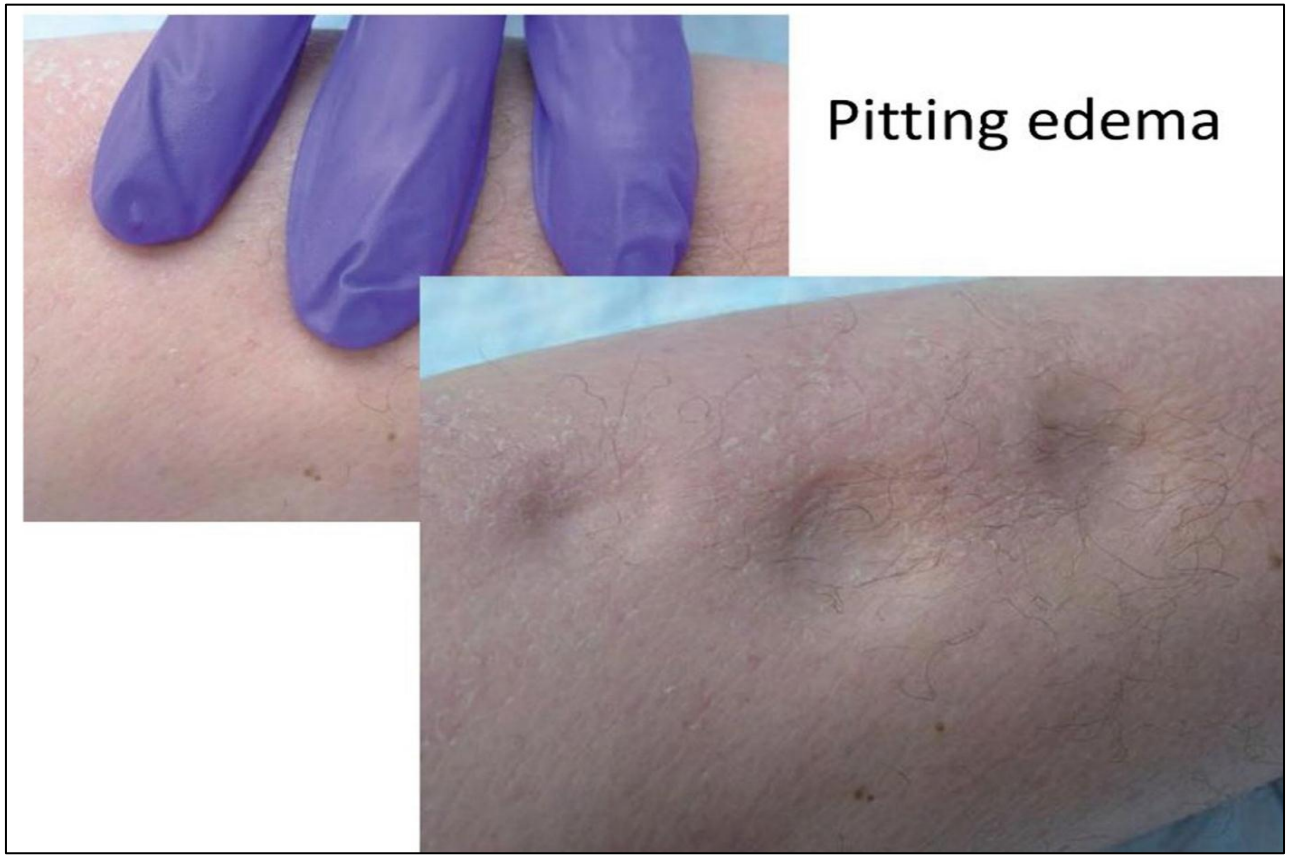
Liver cirrhosis

**Characteristic feature :**

Presence of regenerative nodules and fibrous tissue

# HEMODYNAMIC DISORDERS

## Pitting edema



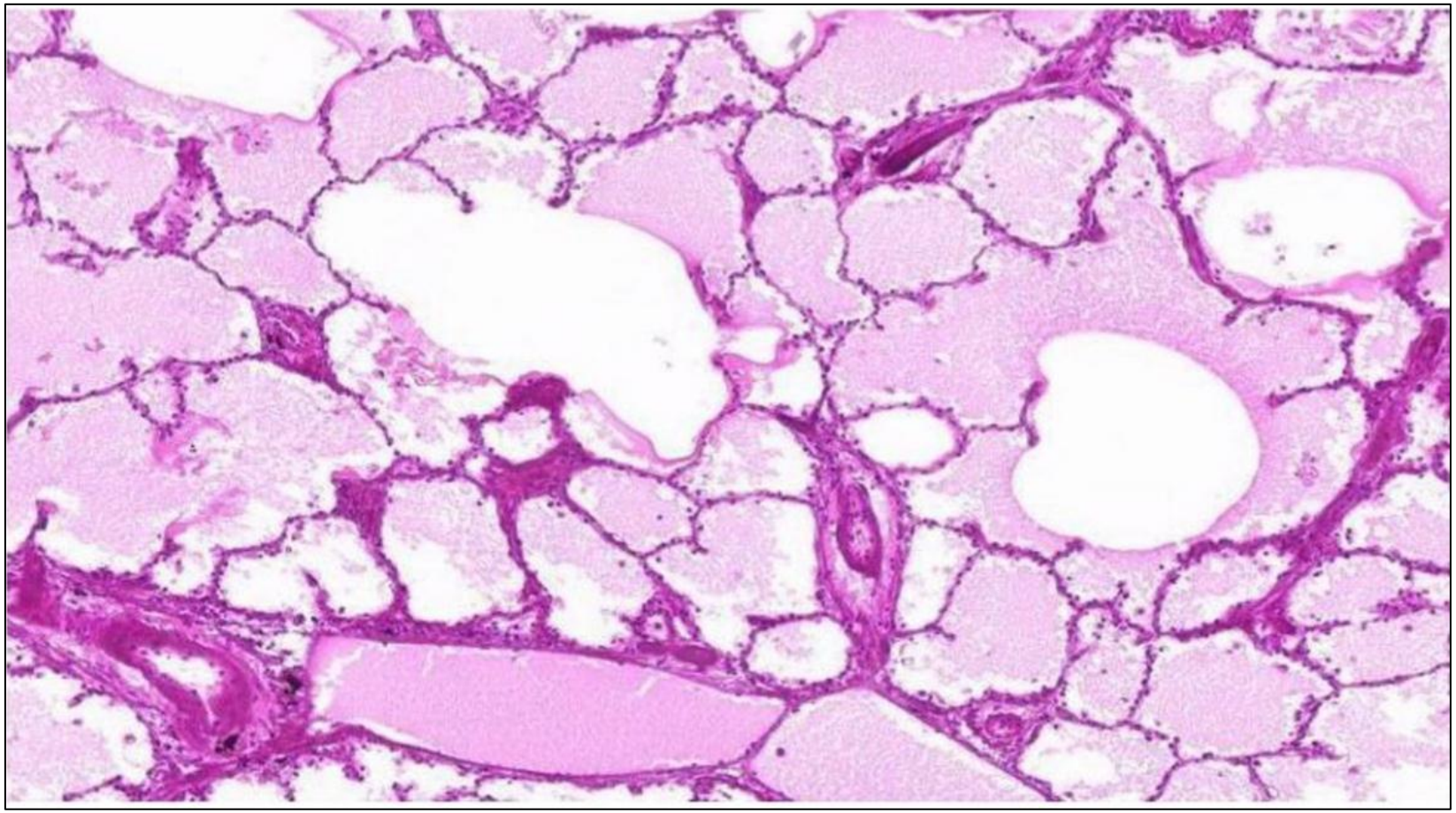

**Diagnosis :**

Pitting edema

**Characteristic feature :**

Depression of the edematous part of the skin after pitting

## Lung edema



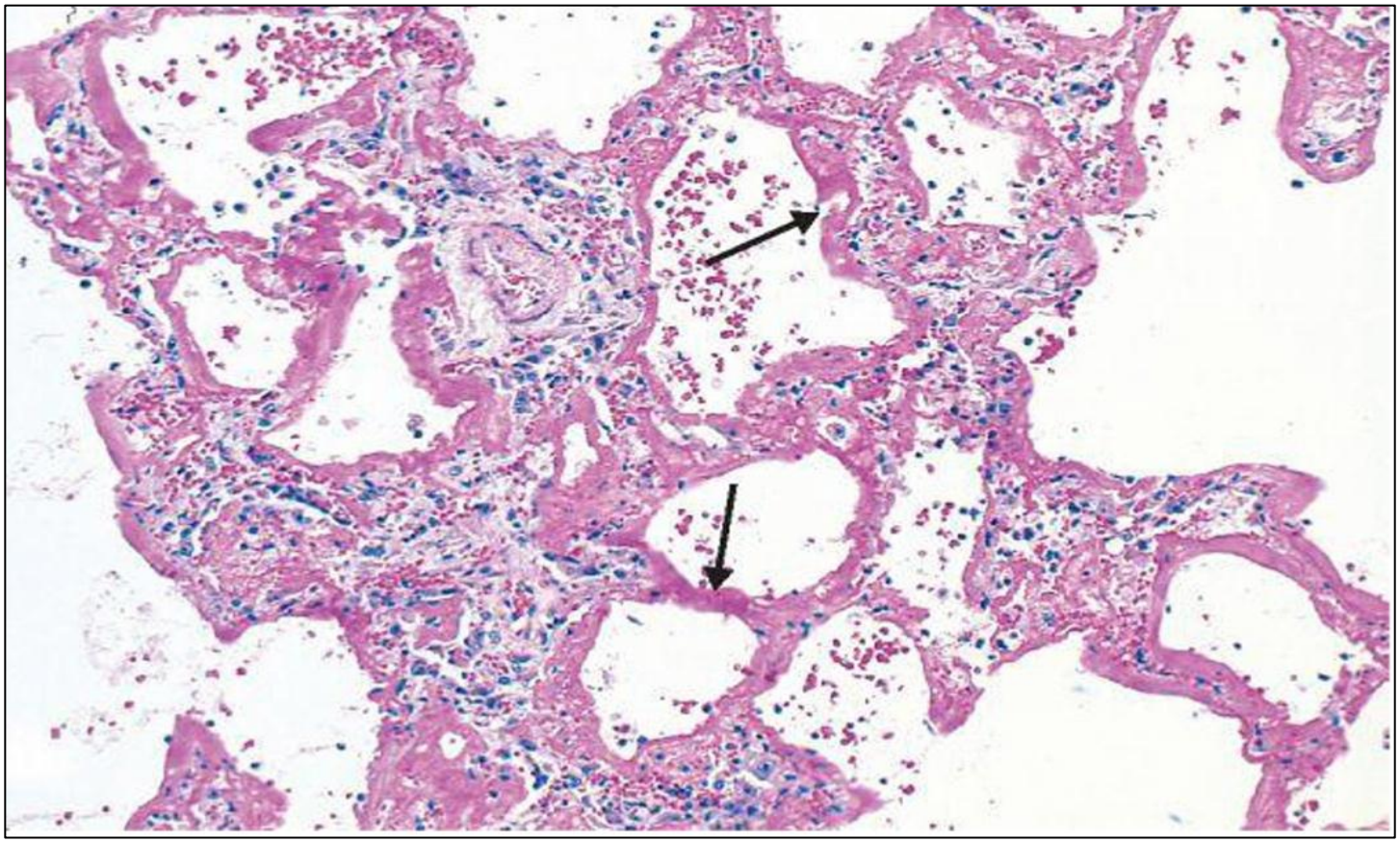
**Diagnosis :**

Lung edema

**Characteristic feature :**

Large alveolar spaces filled with fluid and thin alveolar walls

## Acute congestion



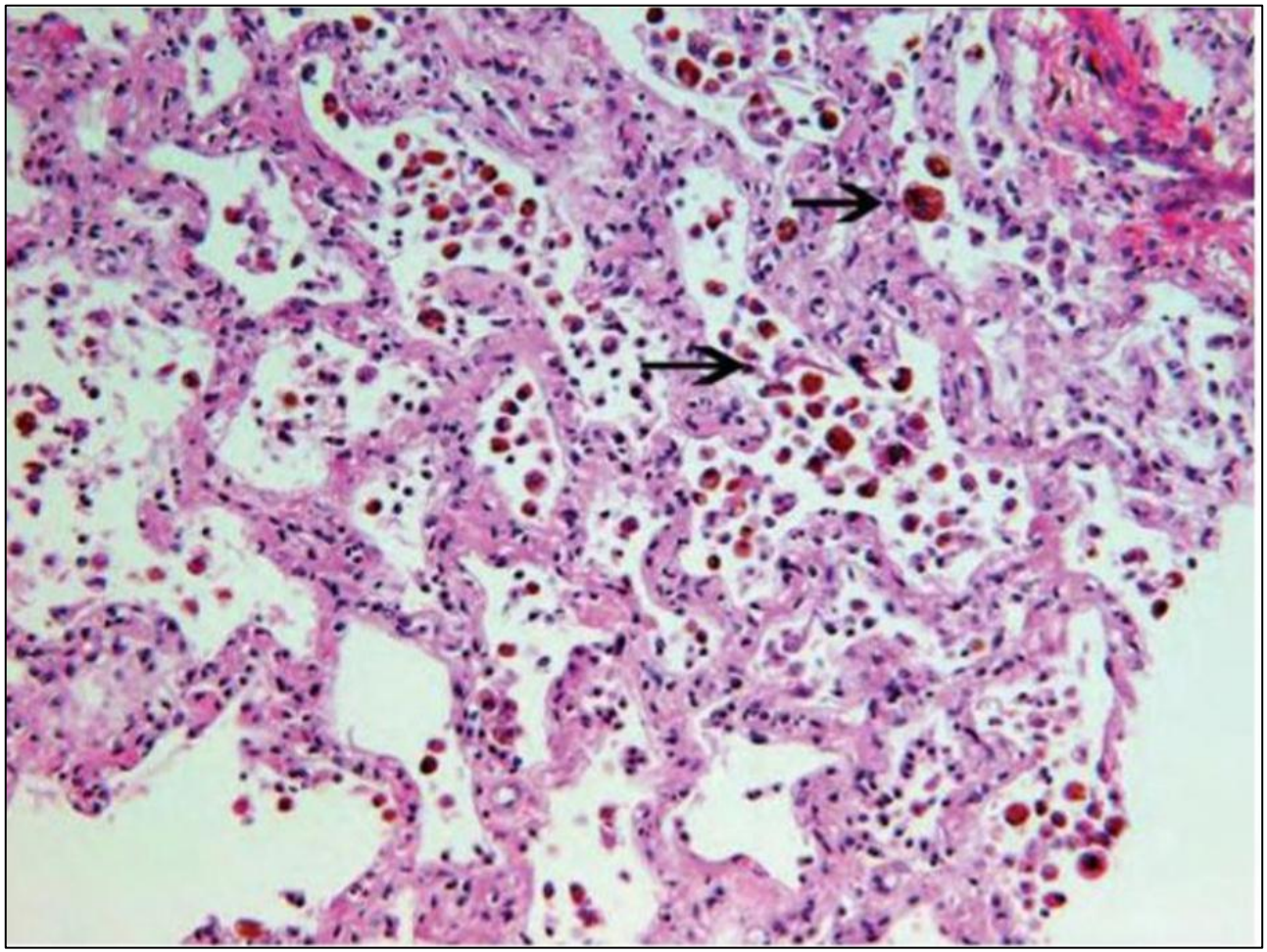
**Diagnosis :**

Acute congestion (in the lung)

**Characteristic feature :**

Presence of fluid and RBCs in the alveolar spaces

## Chronic congestion



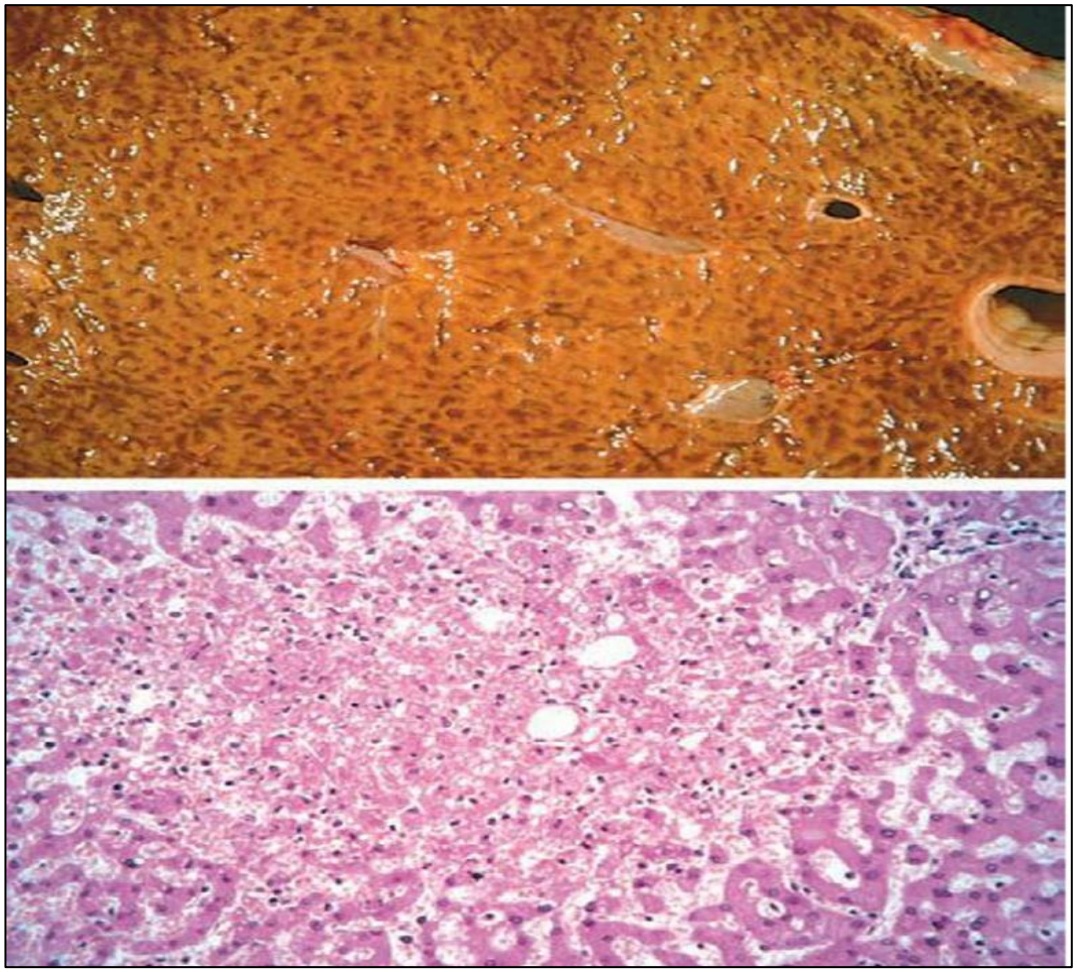
**Diagnosis :**

Chronic congestion (in the lung)

**Characteristic feature :**

Presence of hemosiderin laden cells (heart failure cells)

## Chronic congestion



**Diagnosis :**

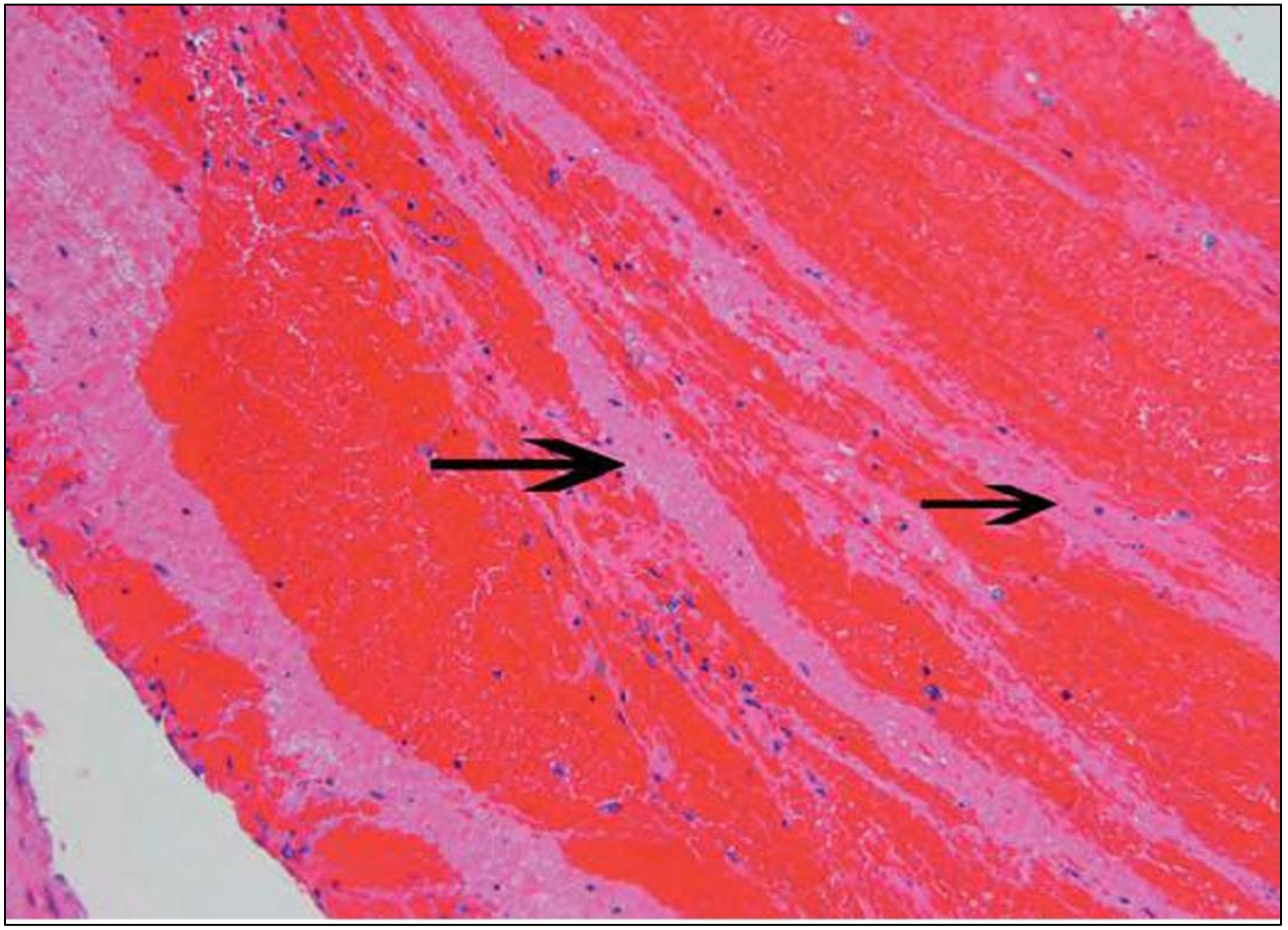
Chronic passive congestion (of the liver)

**Characteristic feature :**

**-Grossly :** alternative pale and dark areas (nutmeg appearance)

**-Microscopically :** pale area of coagulative necrosis and dark area of normal viable tissue

# Thrombus



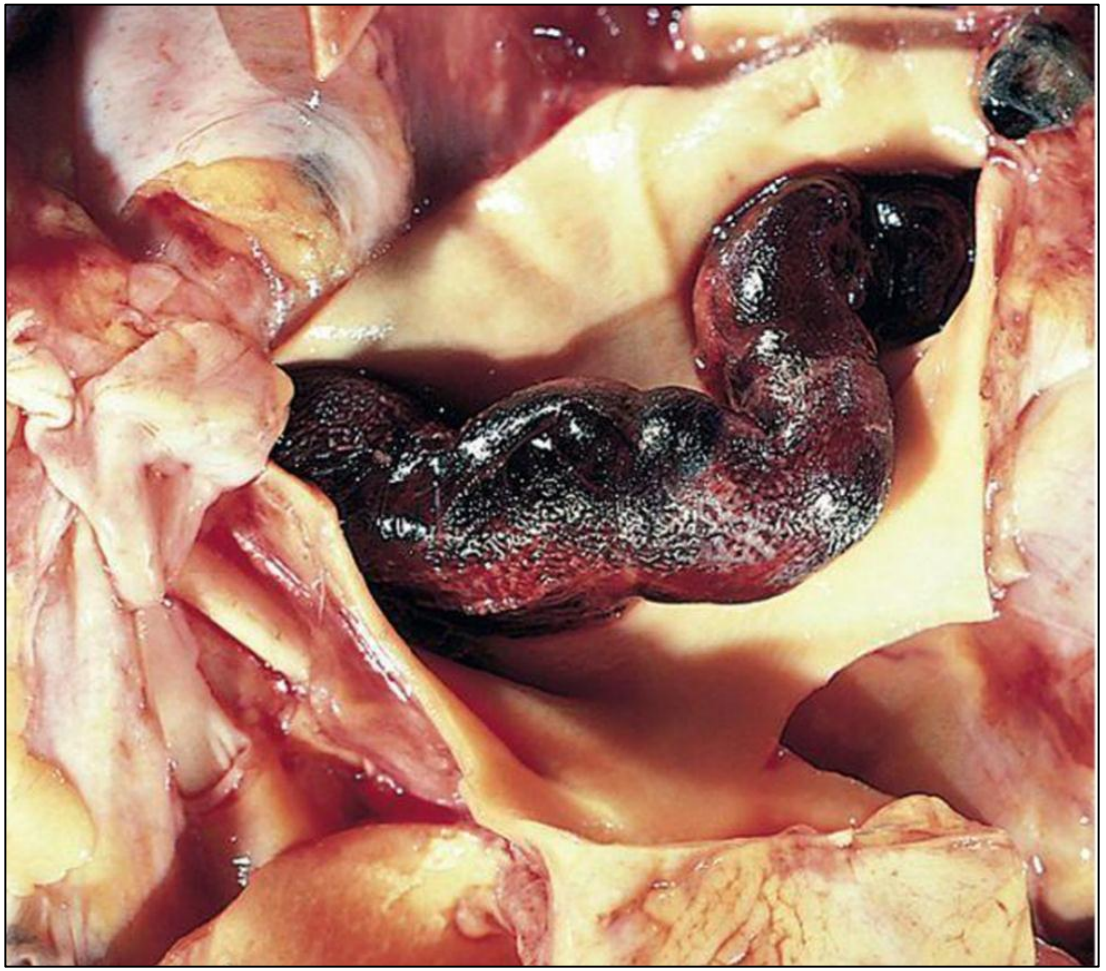
**Diagnosis :**

Thrombus

**Characteristic feature :**

Presence of lines of Zahn (alternative layers of red fibrin & RBCs and pale aggregated platelets)

# Massive pulmonary embolism



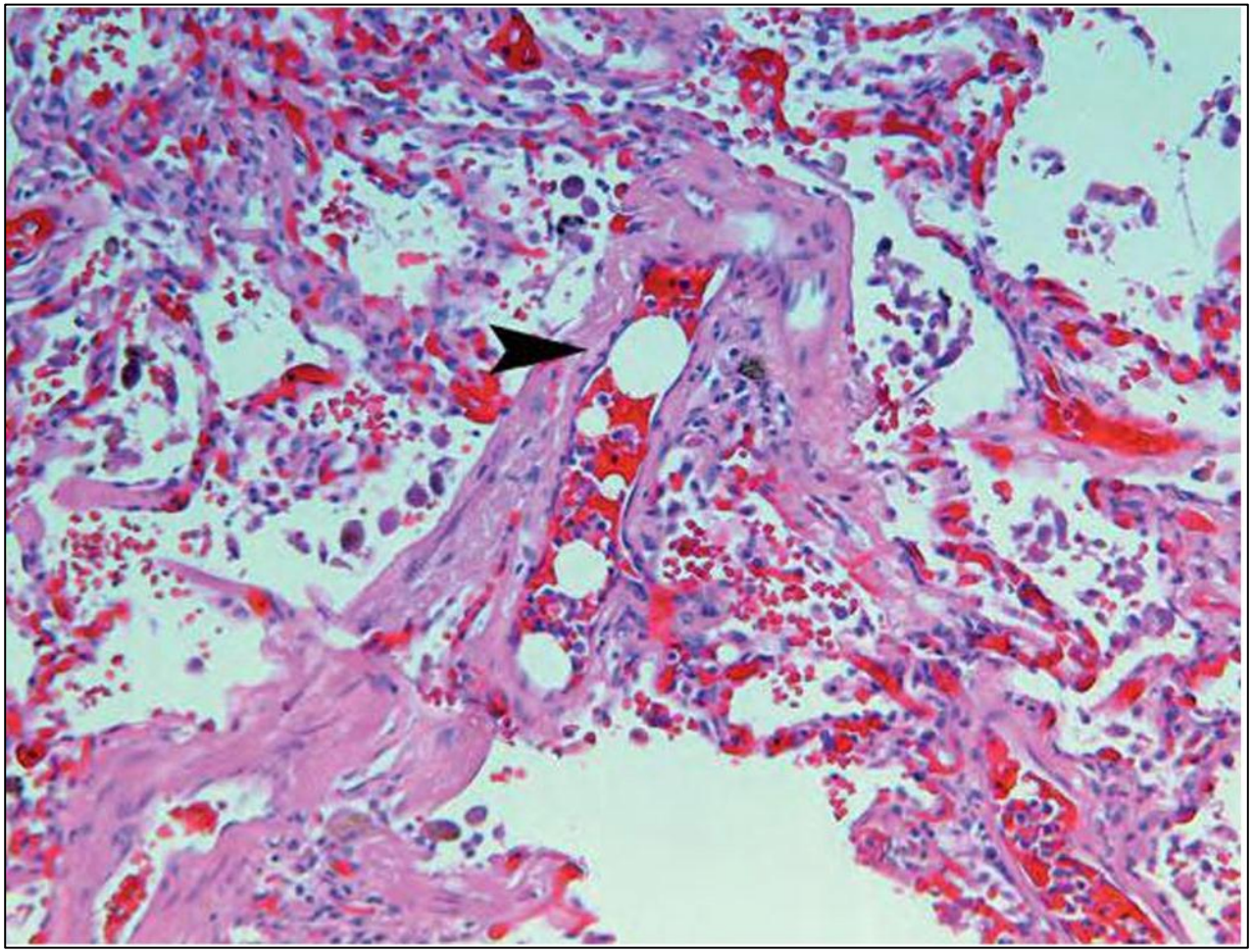
**Diagnosis :**

Massive pulmonary embolism

**Characteristic feature :**

Large embolus inside the pulmonary artery

# Embolism



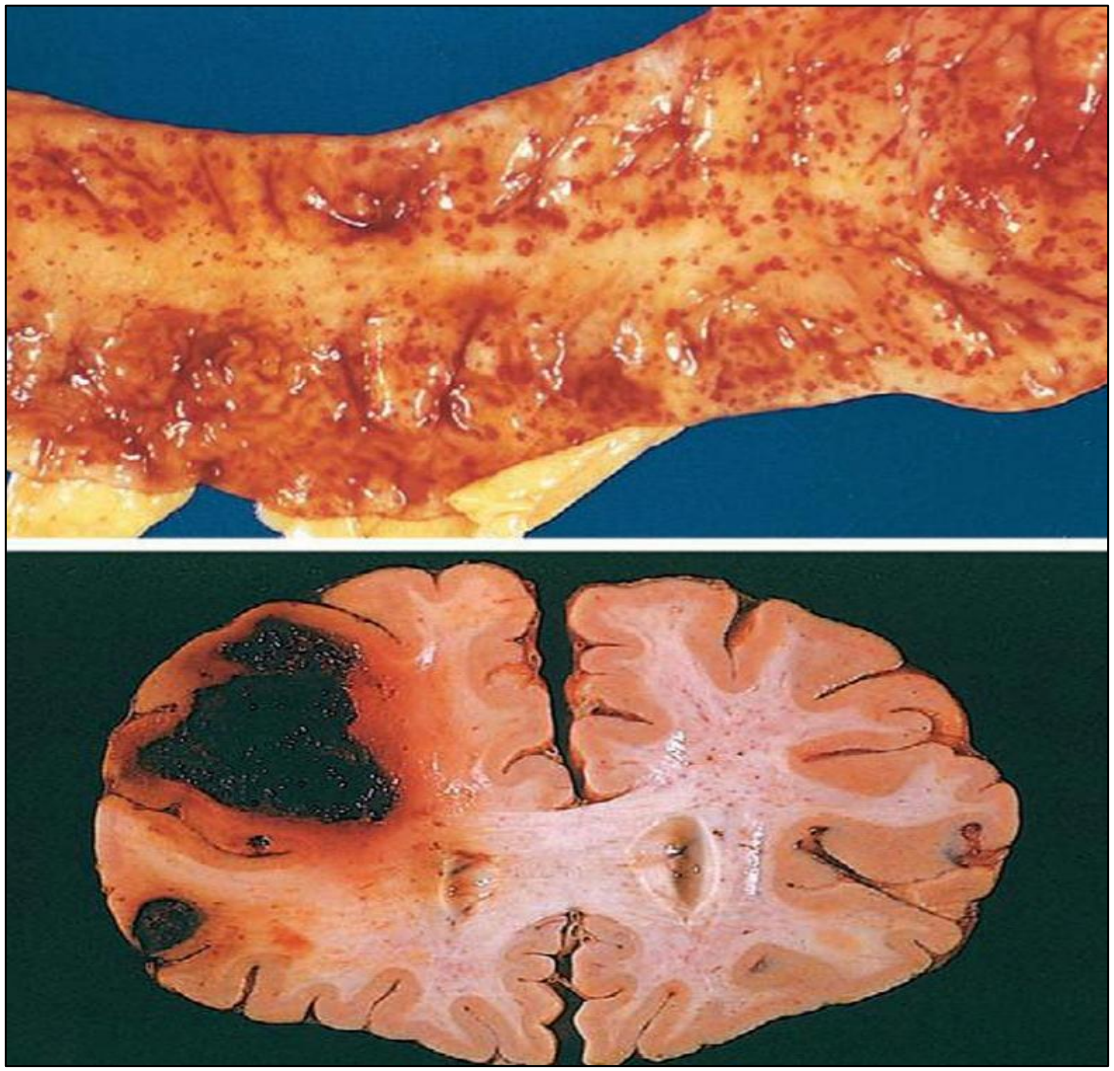
**Diagnosis :**

Fat or air embolus

**Characteristic feature :**

Presence of globular massed inside the blood vessel

# Massive pulmonary embolism



**Diagnosis :**

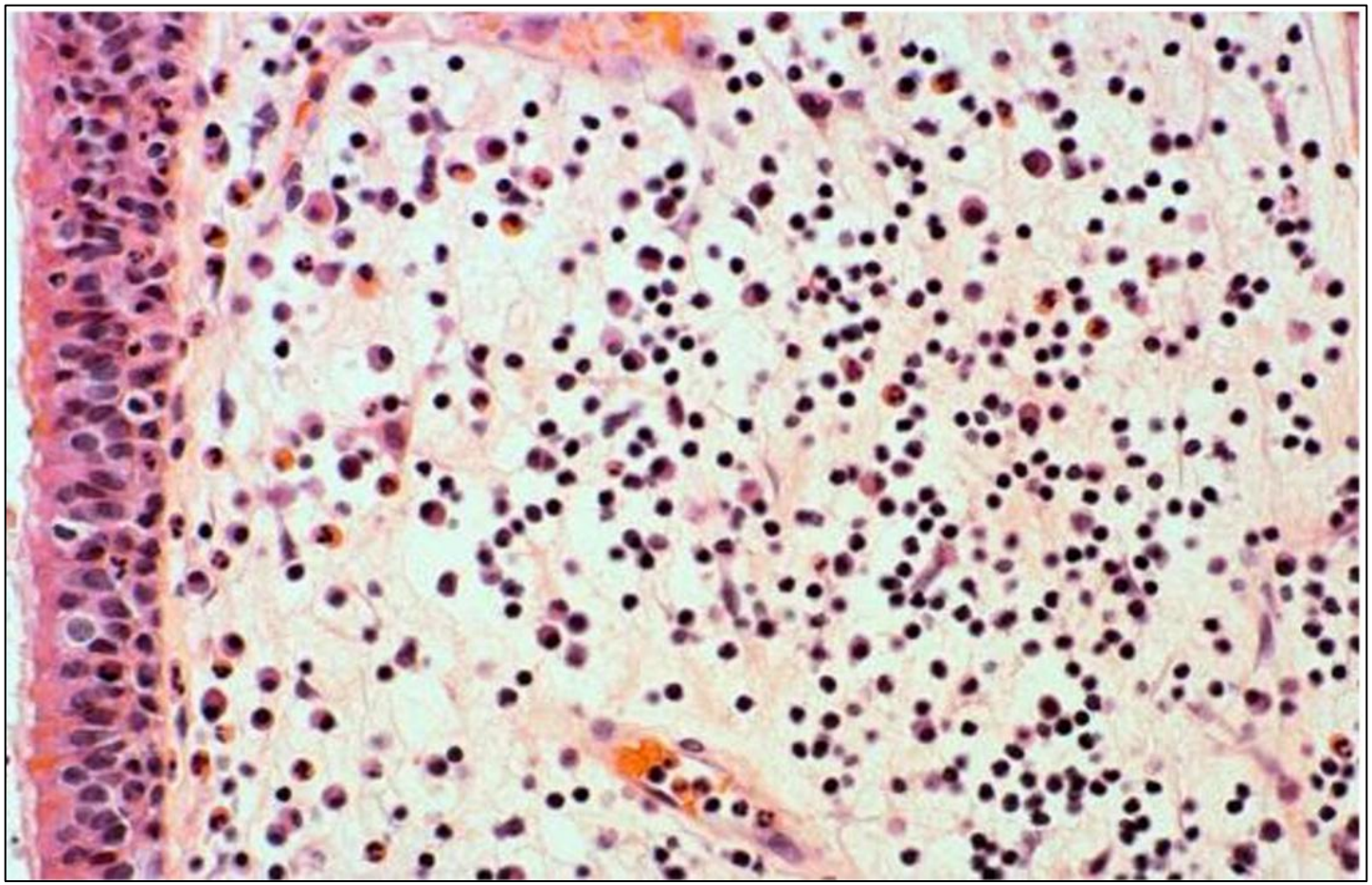
Punctate petechial hemorrhage of the colonic mucosa

**Diagnosis :**

Fatal intracerebral hematoma

# IMMUNOPATHOLOGY

# Type I hypersensitivity reaction (Anaphylaxis)



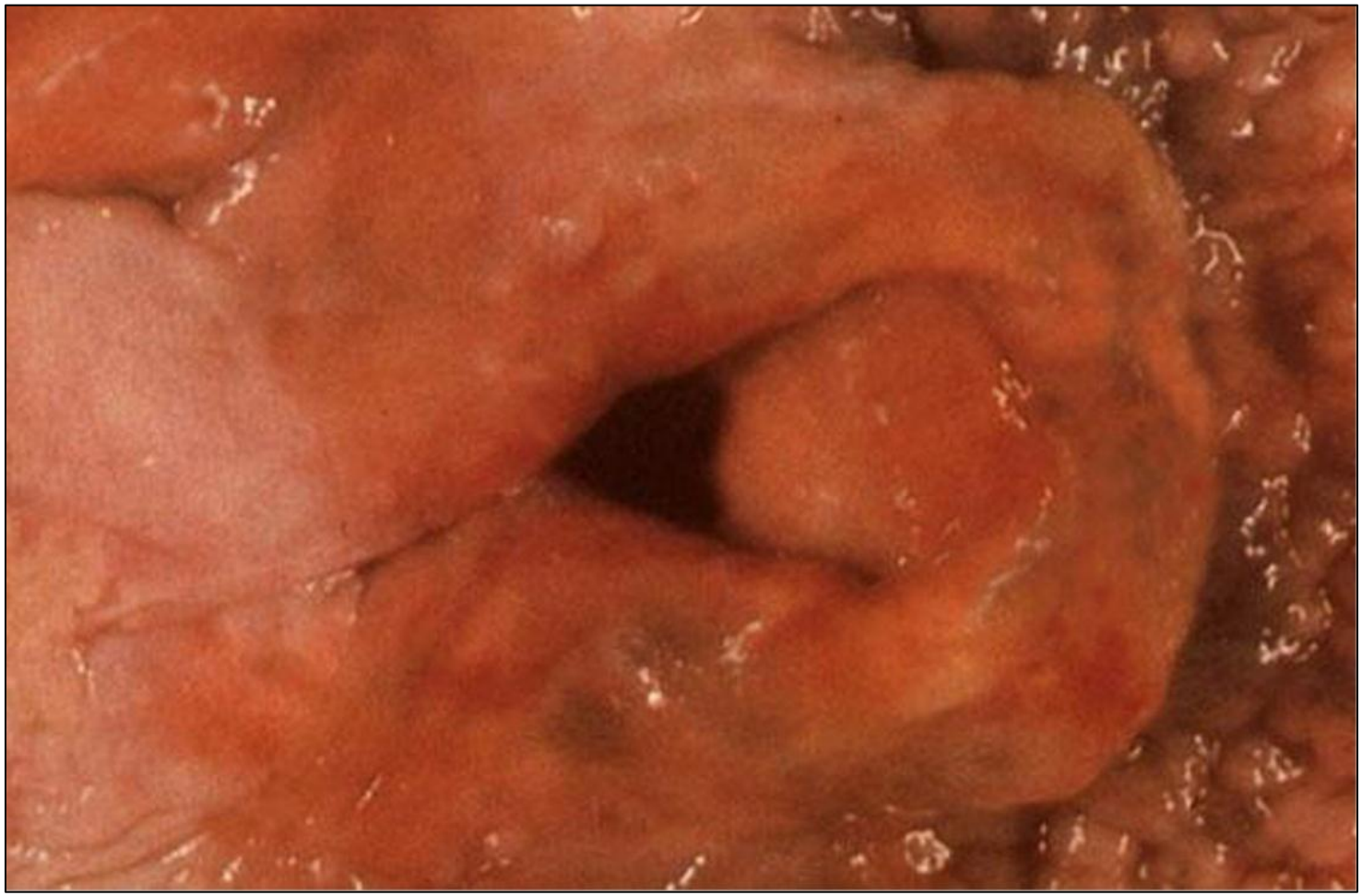
**Diagnosis :**

Type I hypersensitivity reaction (Anaphylaxis)

**Characteristic feature :**

Congestion & edema , eosinophils , lymphocytes & plasma cells

## Laryngeal edema



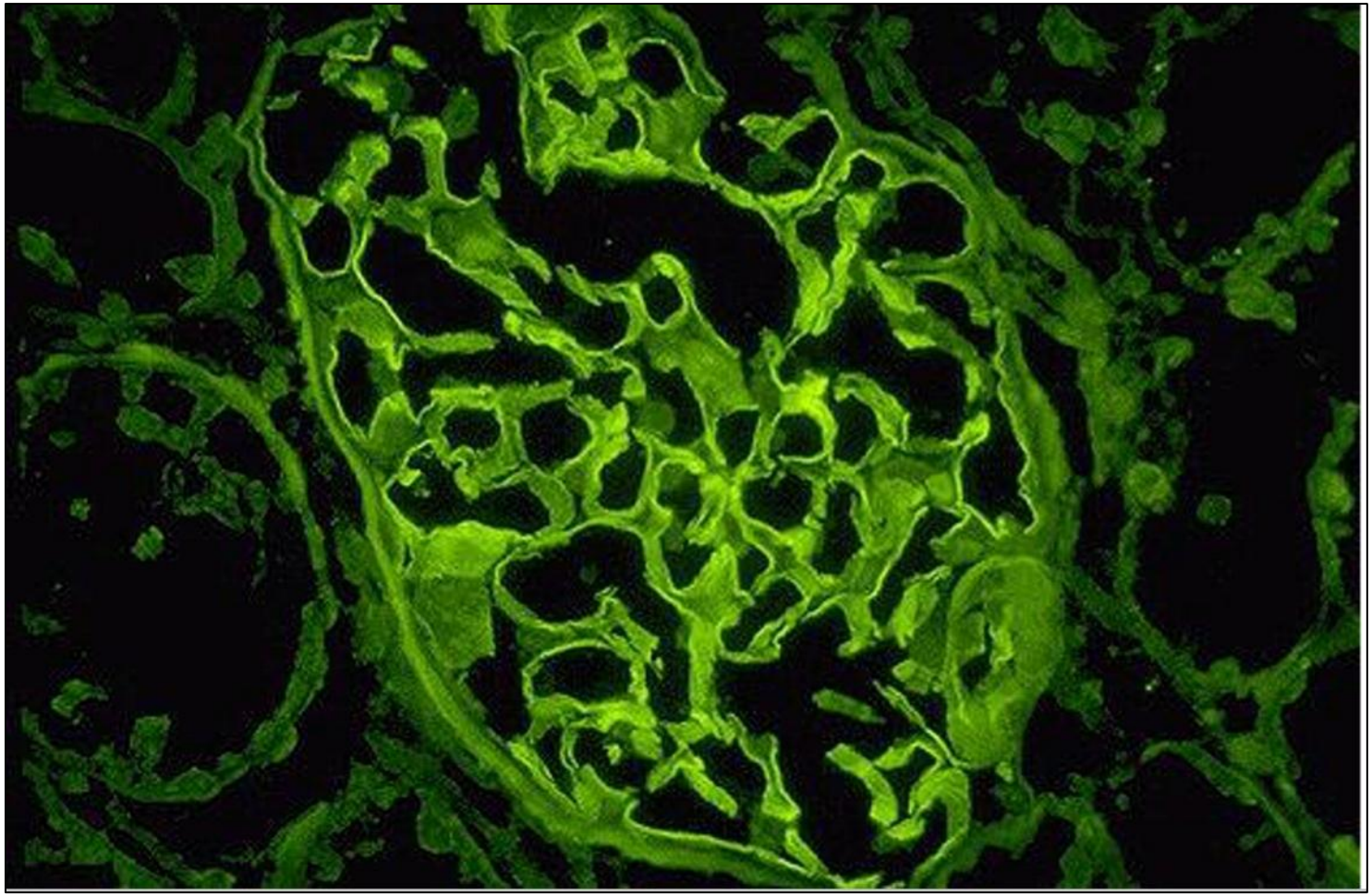
**Diagnosis :**

Laryngeal edema (due to Type I hypersensitivity)

**Characteristic feature :**

Narrowing of the larynx

## Type II hypersensitivity



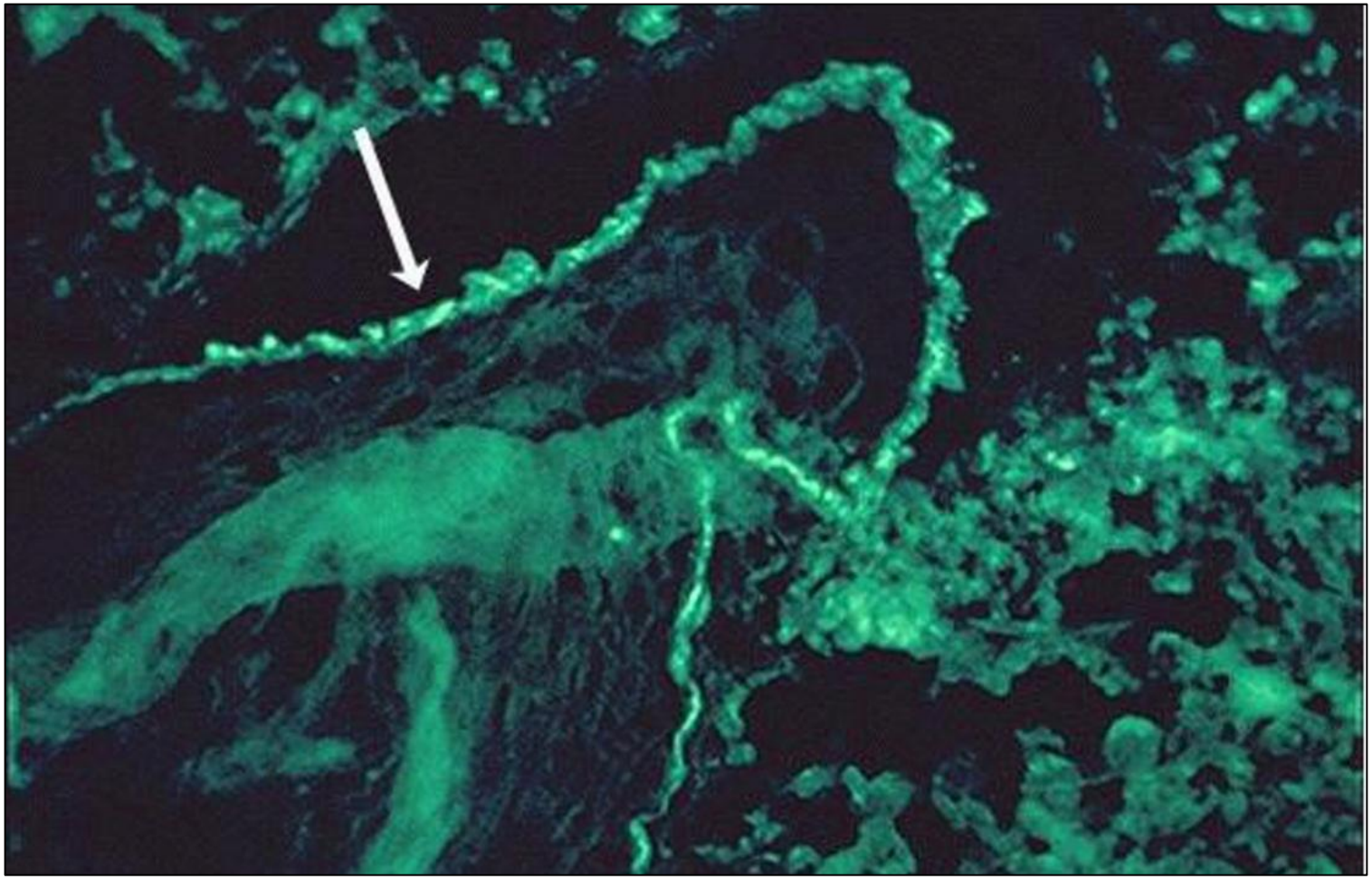
**Diagnosis :**

Immunofluorescence of antibodies(IgG) in patient with Goodpasture syndrome

**Characteristic feature :**

Linear pattern (antiglomerular basement membrane antibodies)

## Type III hypersensitivity



**Diagnosis :**

Immunofluorescence of antibodies in patient with type III hypersensitivity

**Characteristic feature :**

Globular pattern of antibody deposition

## Type IV hypersensitivity

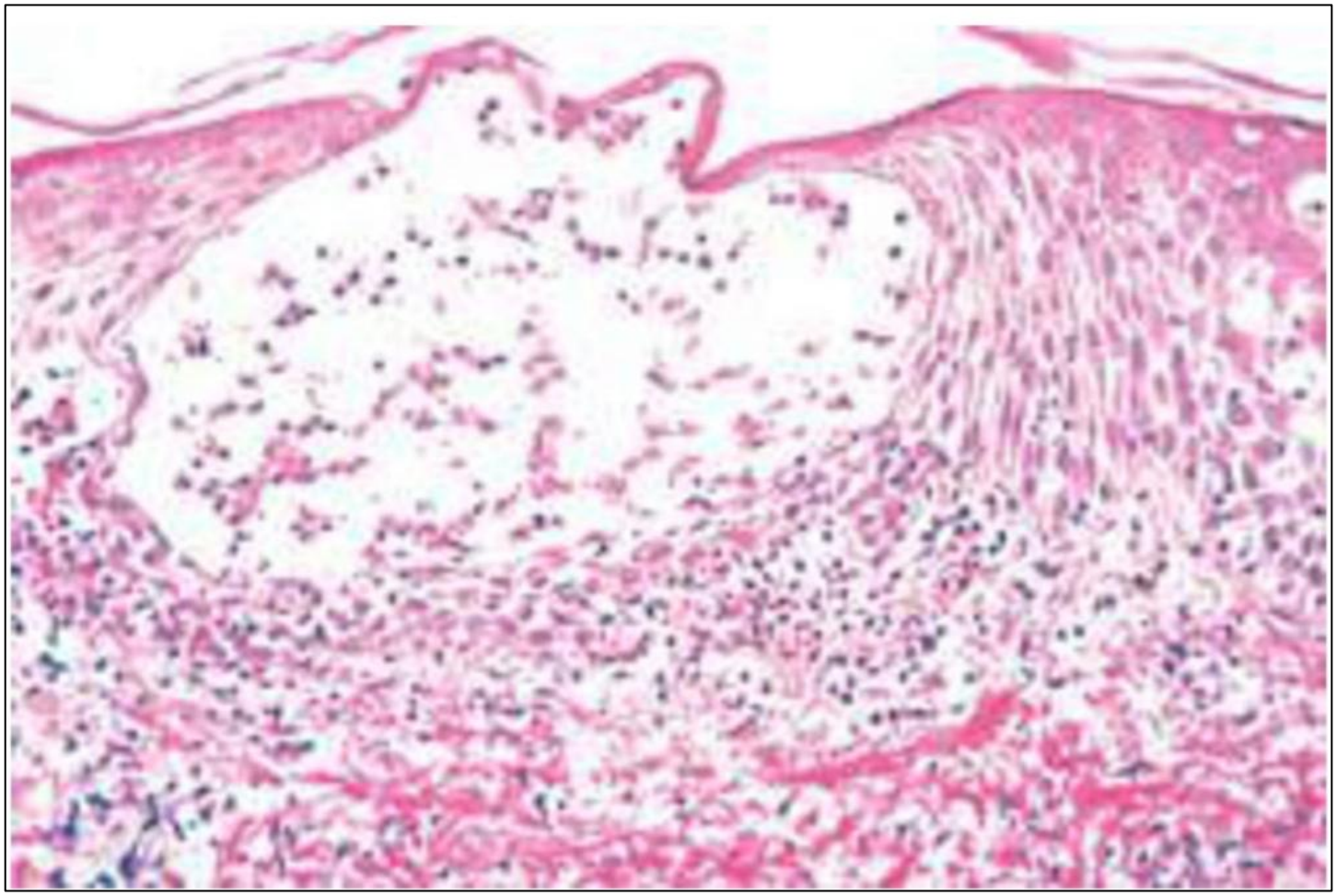
**Diagnosis :**

Contact dermatitis (type IV hypersensitivity )

**Characteristic feature :**

Erythema (redness) and swelling at the site of contact

## Type III hypersensitivity



**Diagnosis :**

Contact dermatitis (type IV hypersensitivity )

**Characteristic feature :**

Thickening and fibrosis of the dermis , the epidermis become thin and infiltrated with lymphocytes

## Systemic lupus erythematosus (SLE)

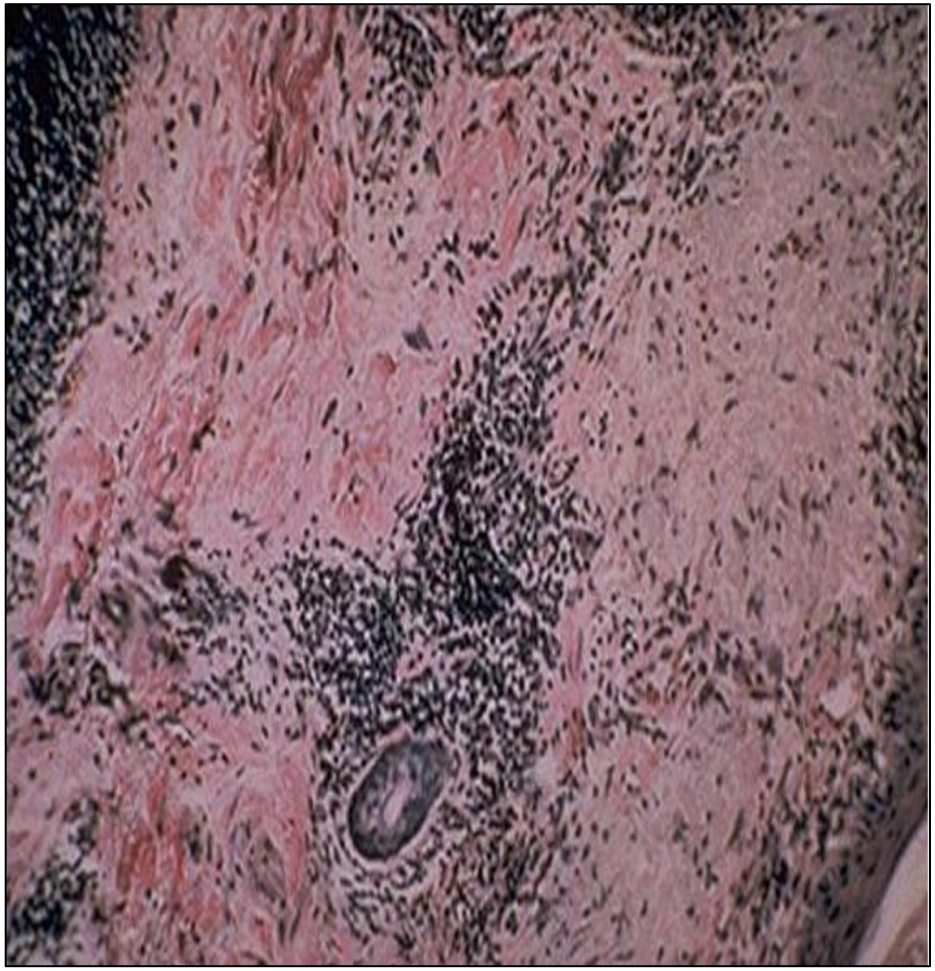
**Diagnosis :**

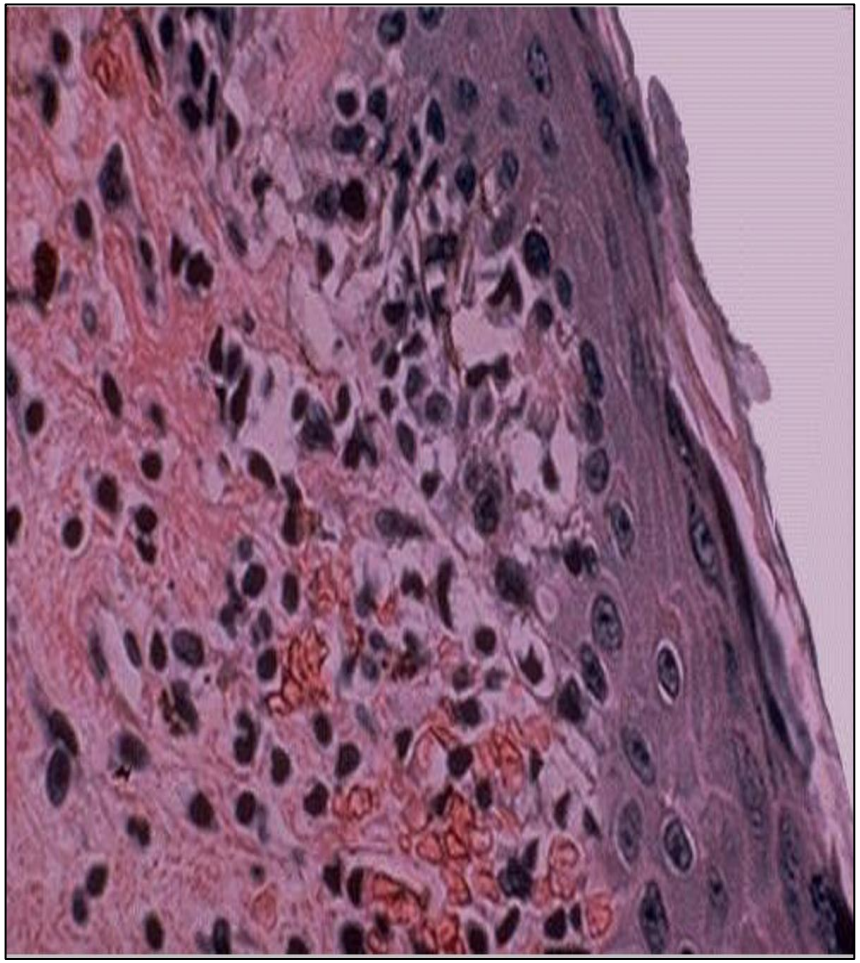
Systemic lupus erythematosus (SLE)

**Characteristic feature :**

Butter-fly rash

## Systemic lupus erythematosus (SLE)





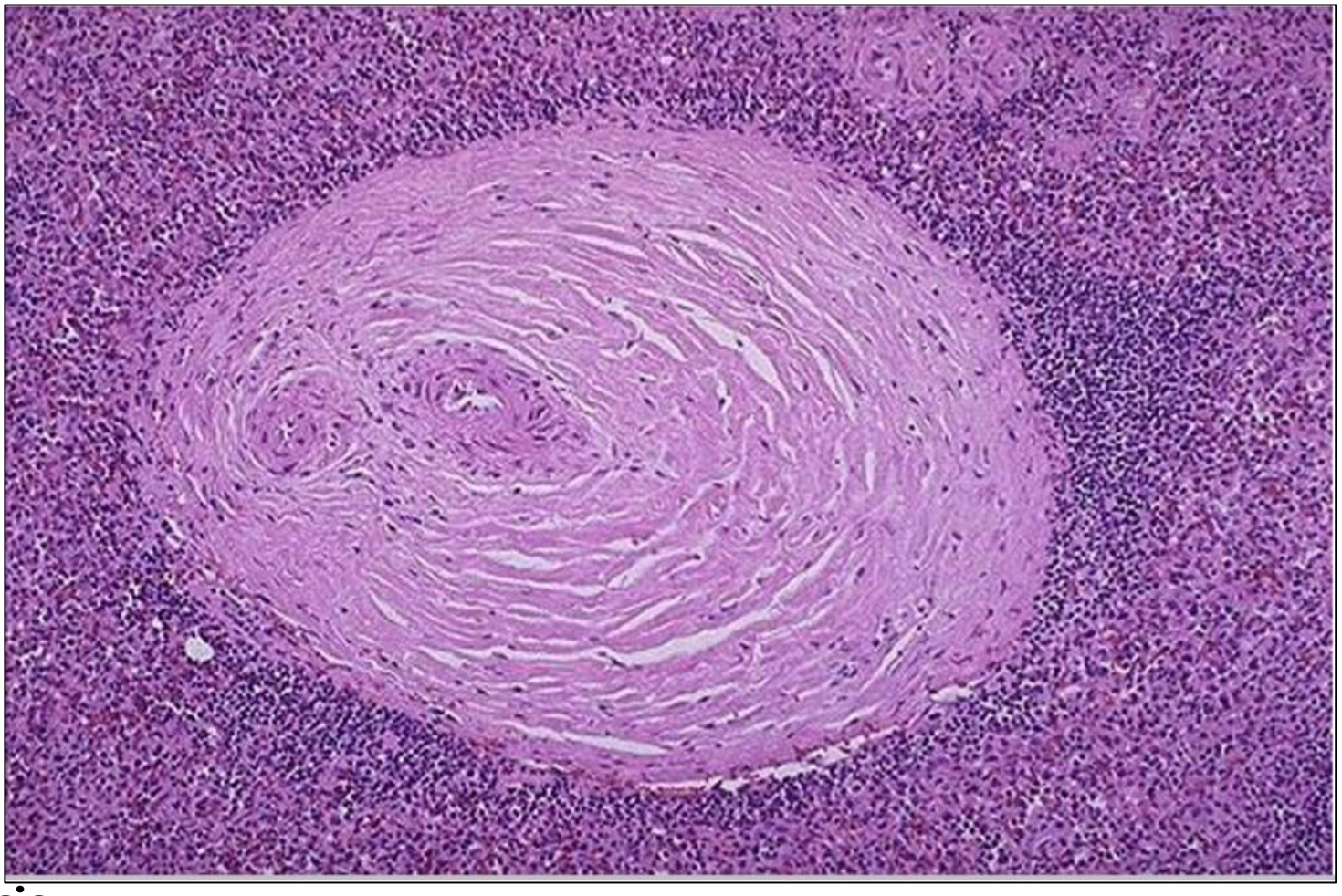
**Diagnosis :**

Systemic lupus erythematosus (SLE)

**Characteristic feature :**

Vasculitis , chronic inflammatory cell infiltration

## Systemic lupus erythematosus (SLE)



**Diagnosis :**

Vasculitis in spleen of a patient with (SLE)

**Characteristic feature :**

Periarterial fibrosis (onion skinning), chronic inflammatory cell infiltration

## Scleroderma

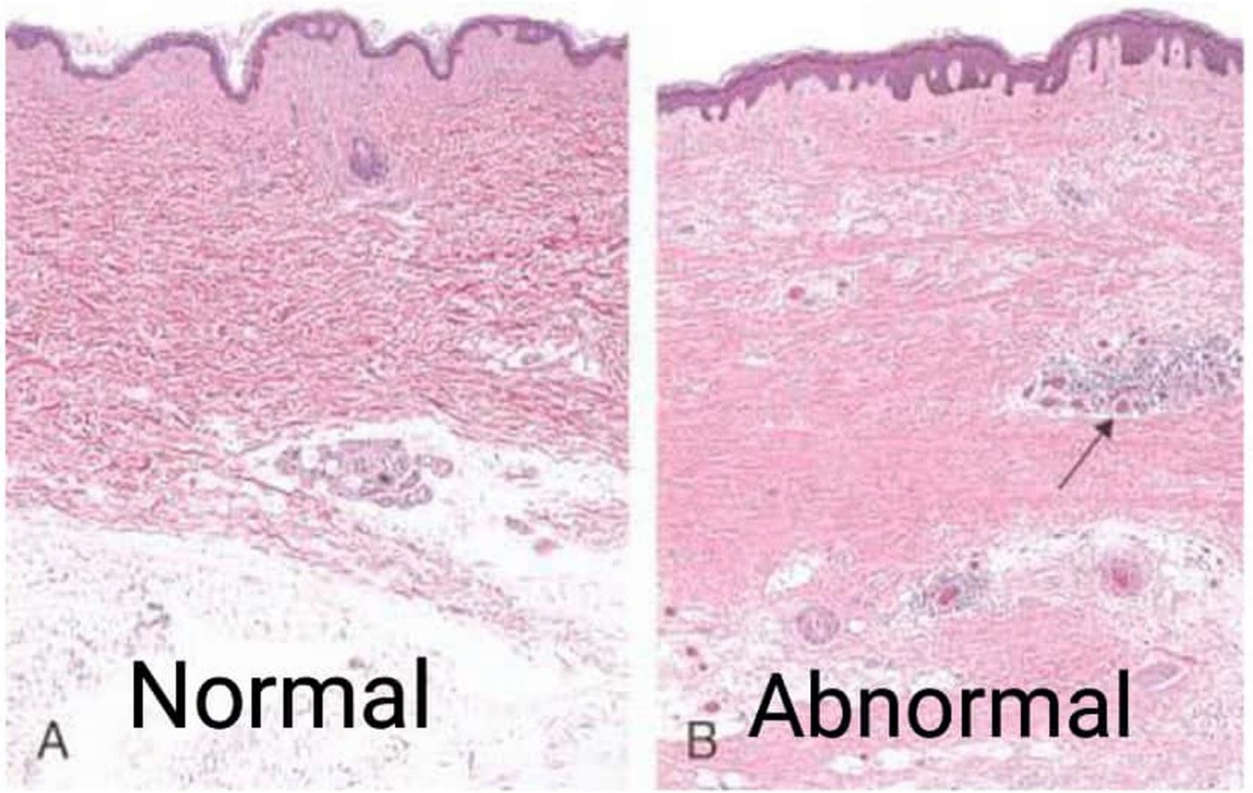
**Diagnosis :**

Scleroderma

**Characteristic feature :**

The skin is dry rigid with no hair or sweat glands ,also cheilosis at the corners of the mouth

## Scleroderma



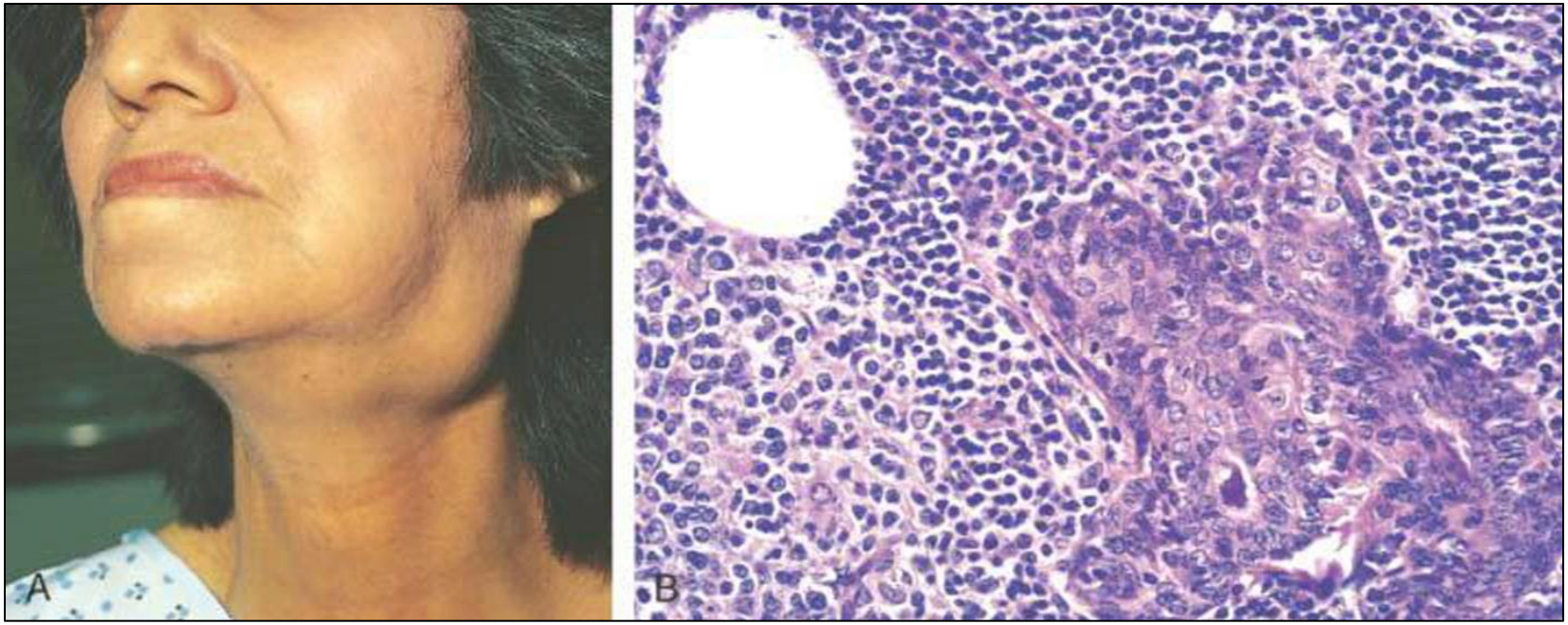

**Diagnosis :**

Scleroderma

**Characteristic feature :**

Loss of skin appendages , thinning of the epidermis , thickening and fibrosis of the dermis

# Sjögren syndrome




**Diagnosis :**

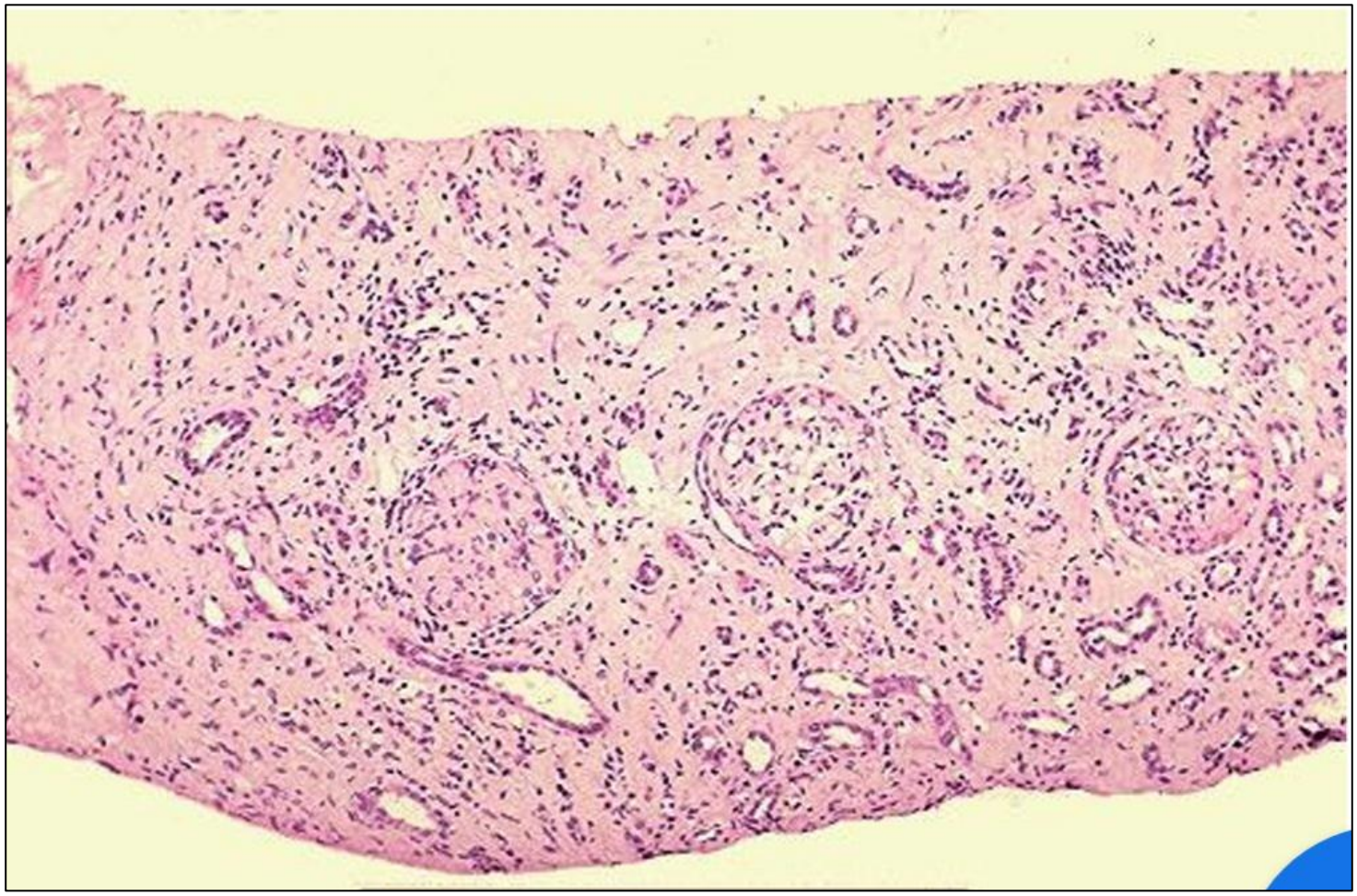
Sjögren syndrome

**Characteristic feature :**

**-Grossly :** enlargement of the salivary glands

**-Microscopically :** chronic inflammatory cells infiltrate , hyperplasia of the glandular tissue

## Chronic vascular rejection of transplanted tissue



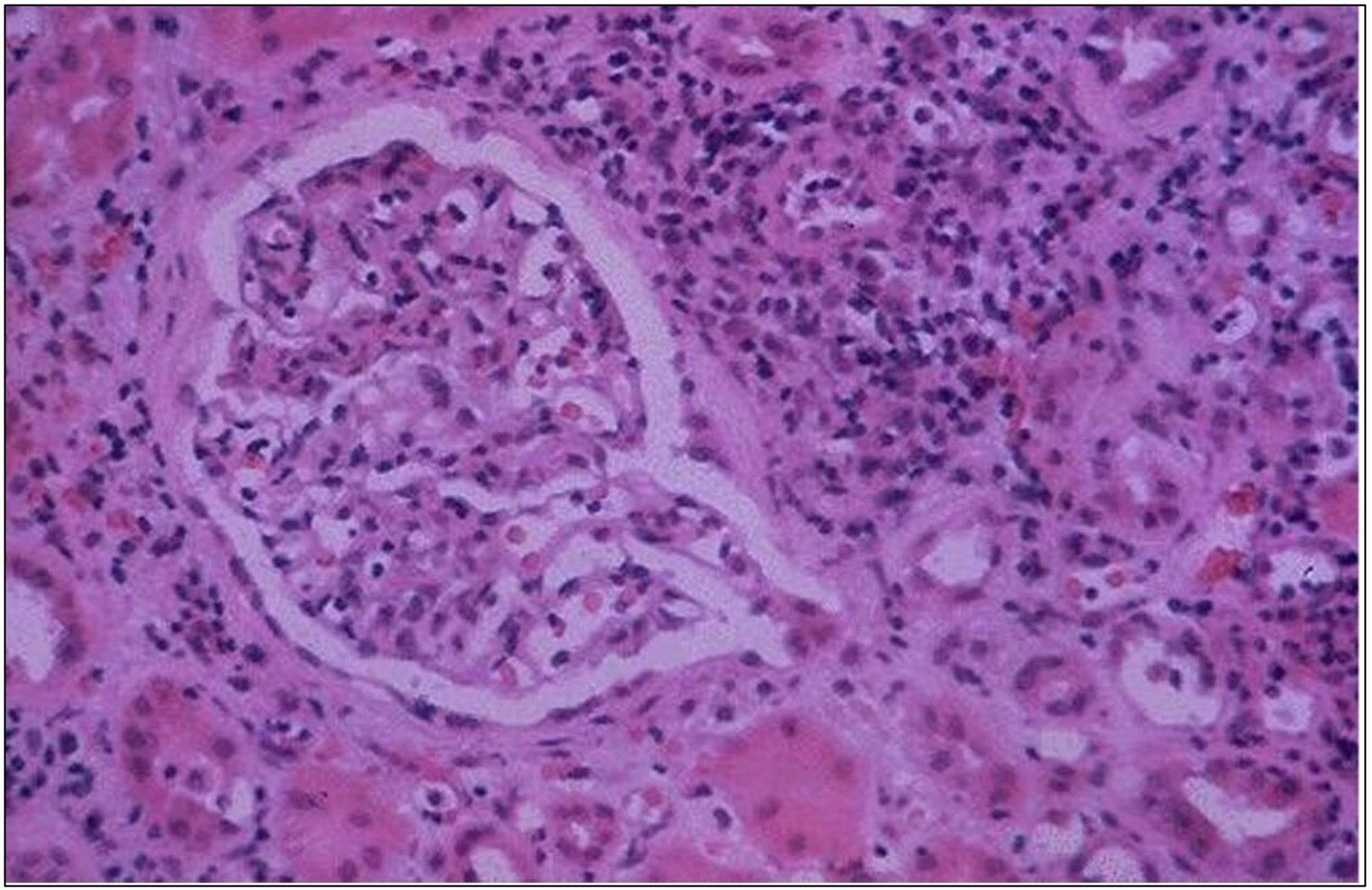
**Diagnosis :**

Chromic vascular rejection of transplanted kidney

**Characteristic feature :**

Severe fibrosis , lymphocyte infiltrate

# Acute vascular rejection of transplanted tissue



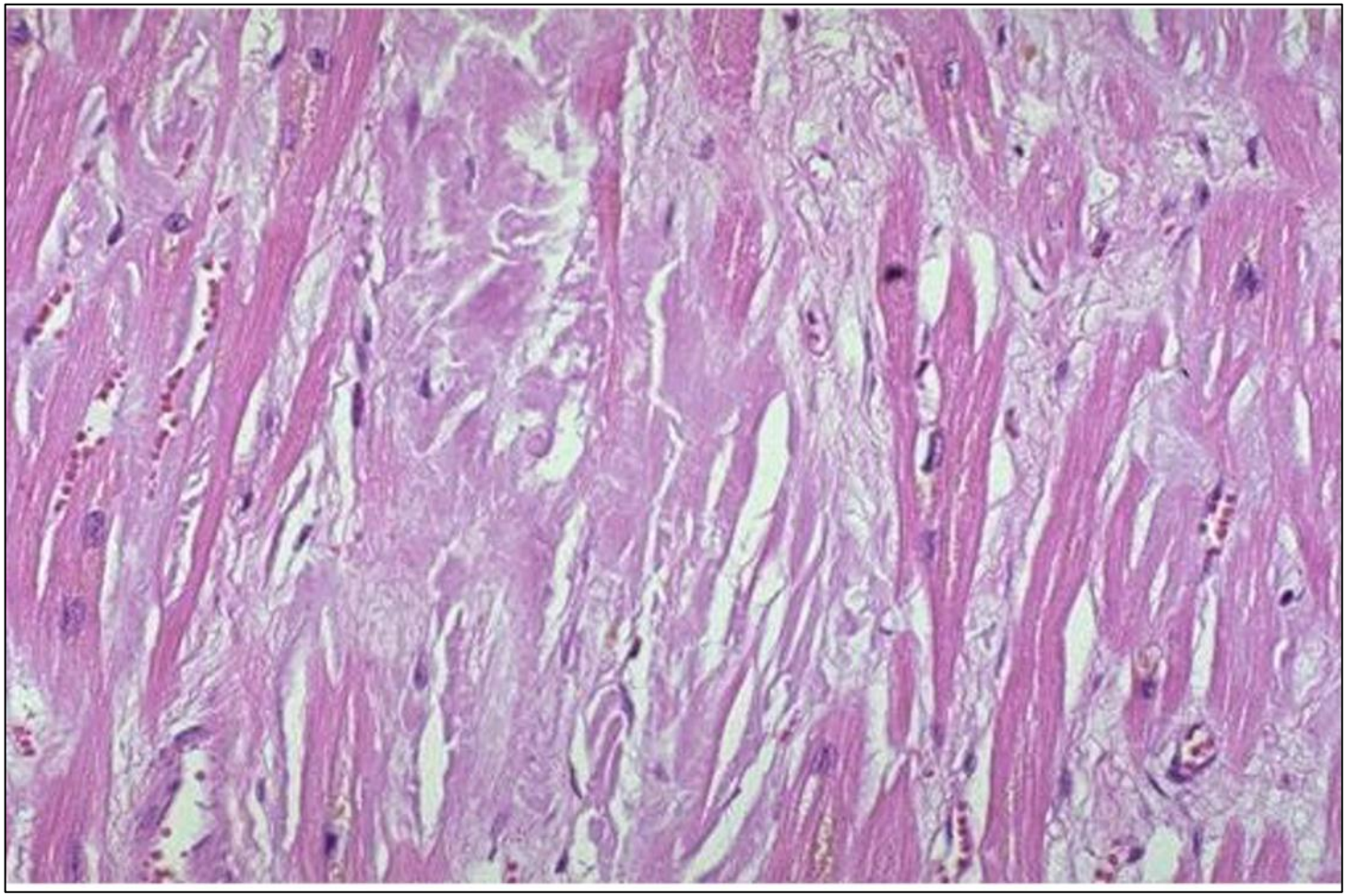
**Diagnosis :**

Acute vascular rejection of transplanted kidney

**Characteristic feature :**

Inflammatory cell infiltrate (mainly in the interstitium) ,the glomeruli are normal , the renal tubules are infiltrated by many lymphocytes

# Amyloidosis



**Diagnosis :**

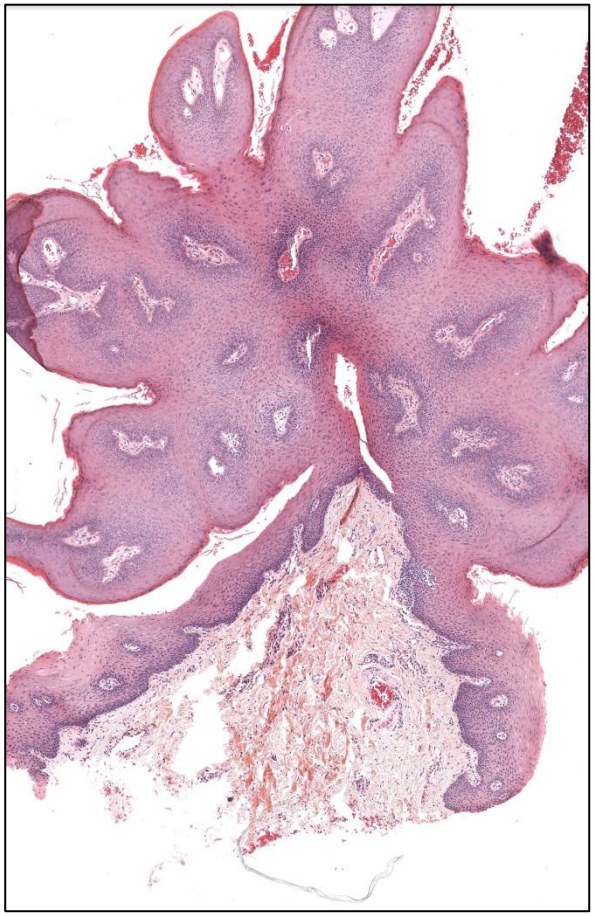
Amyloidosis in the heart

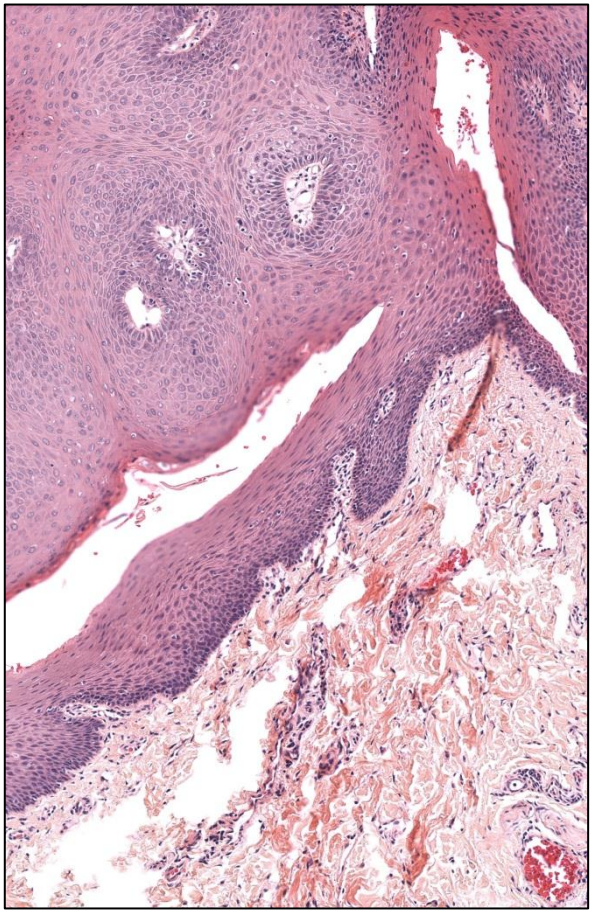
**Characteristic feature :**

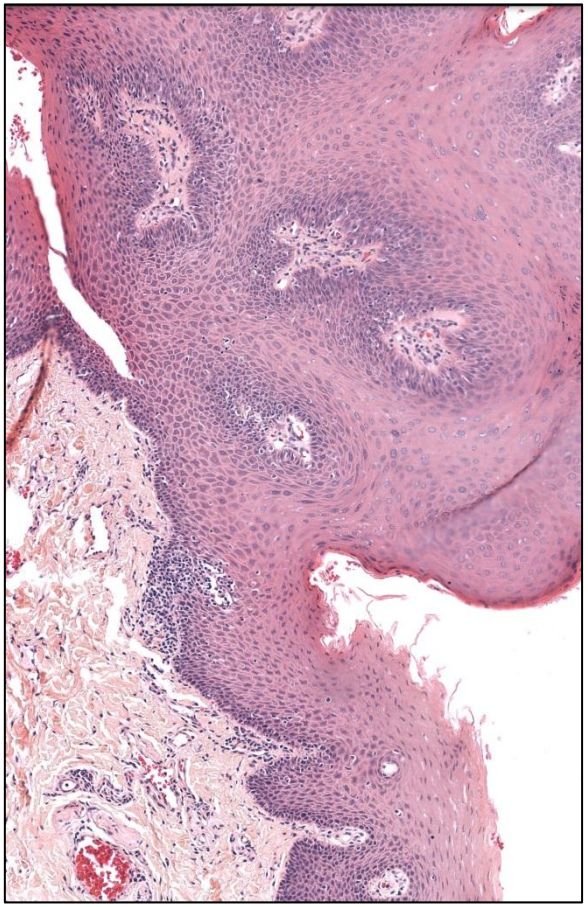
Pale pink amyloid deposits between darker red normal myocytes

# NEOPLASIA

# Benign tumor(squamous cell papilloma)







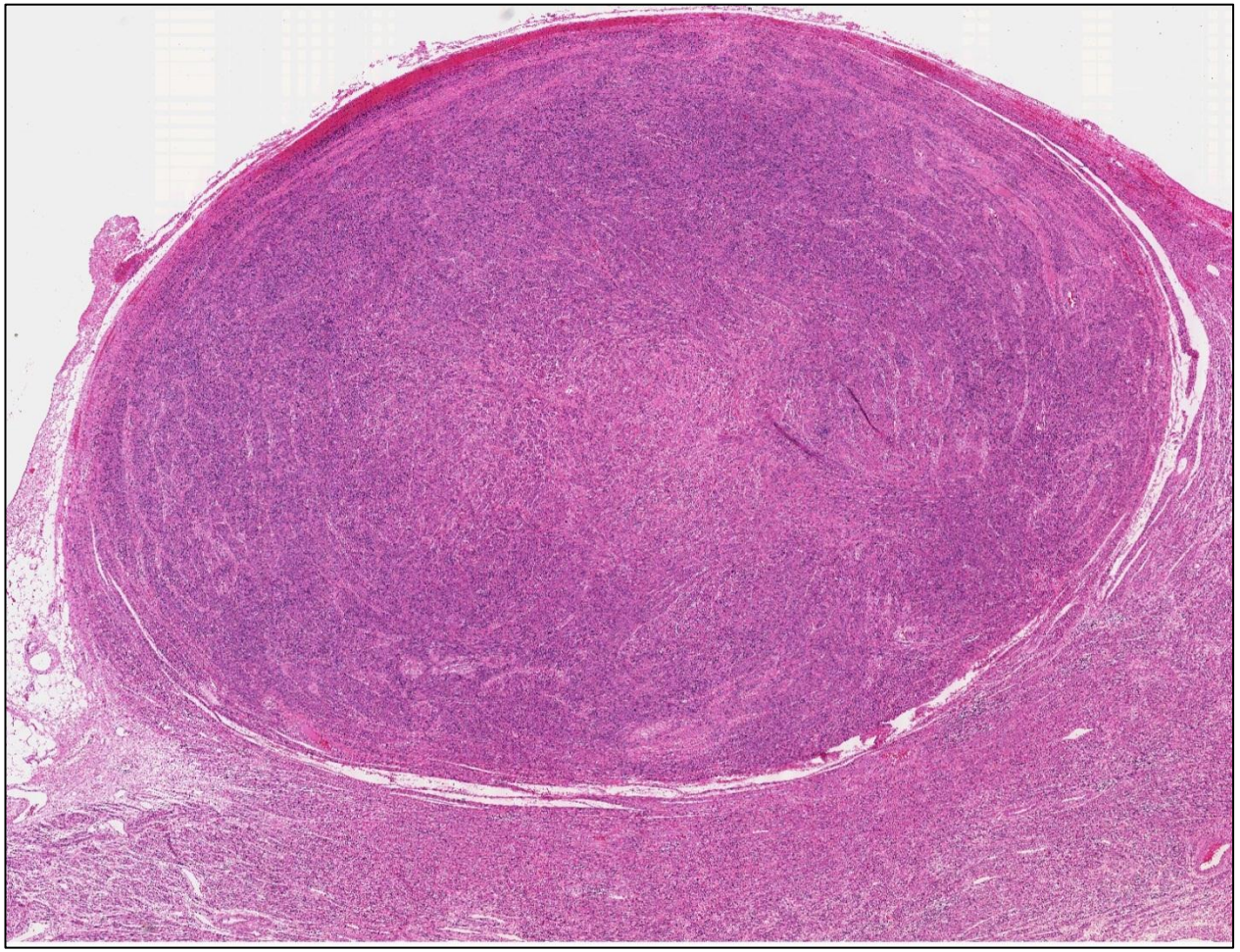
**Diagnosis :**

Benign tumor (squamous cell papilloma)

**Characteristic feature :**

No invasion , will-differentiated cells

## Benign tumor(leiomyoma)



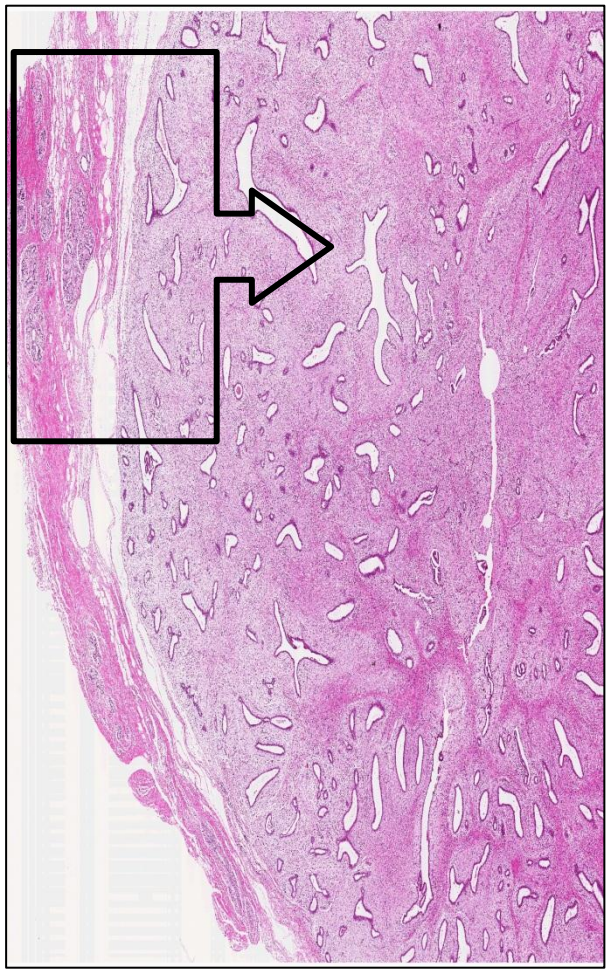
**Diagnosis :**

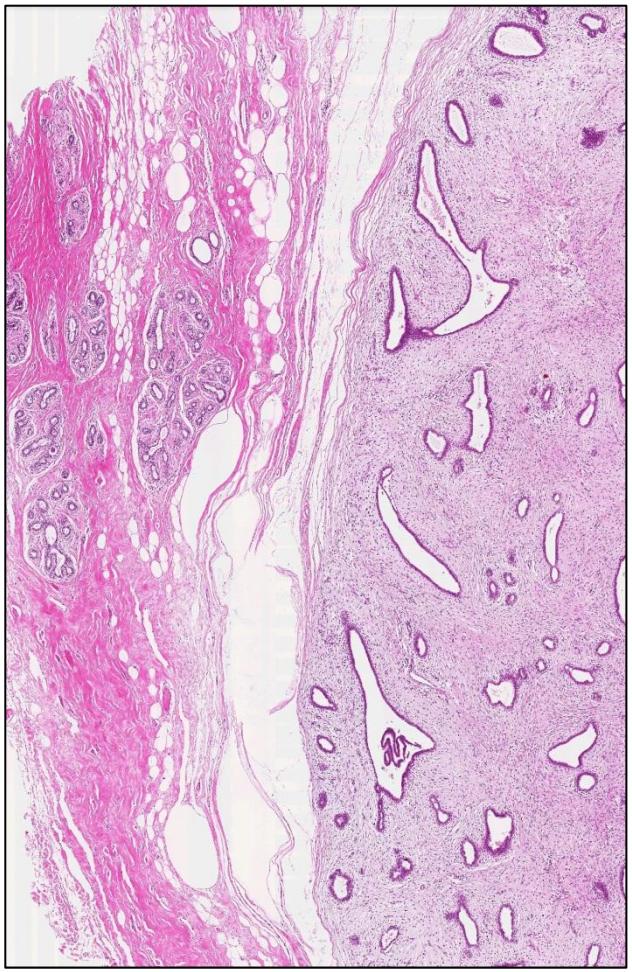
Benign tumor (leiomyoma)

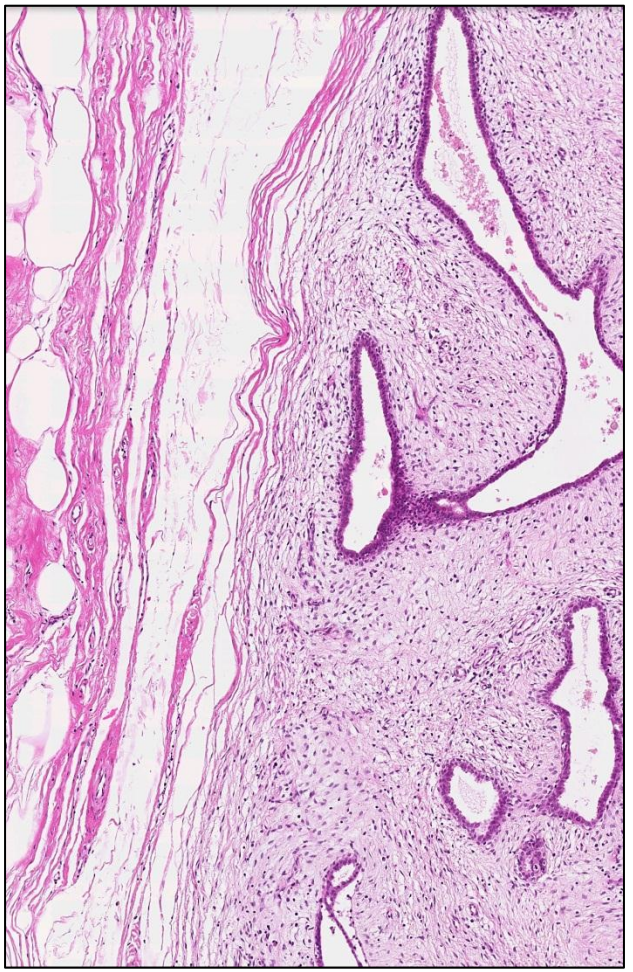
**Characteristic feature :**

No invasion , capsulated

# Benign tumor(fibroadenoma in the breast)







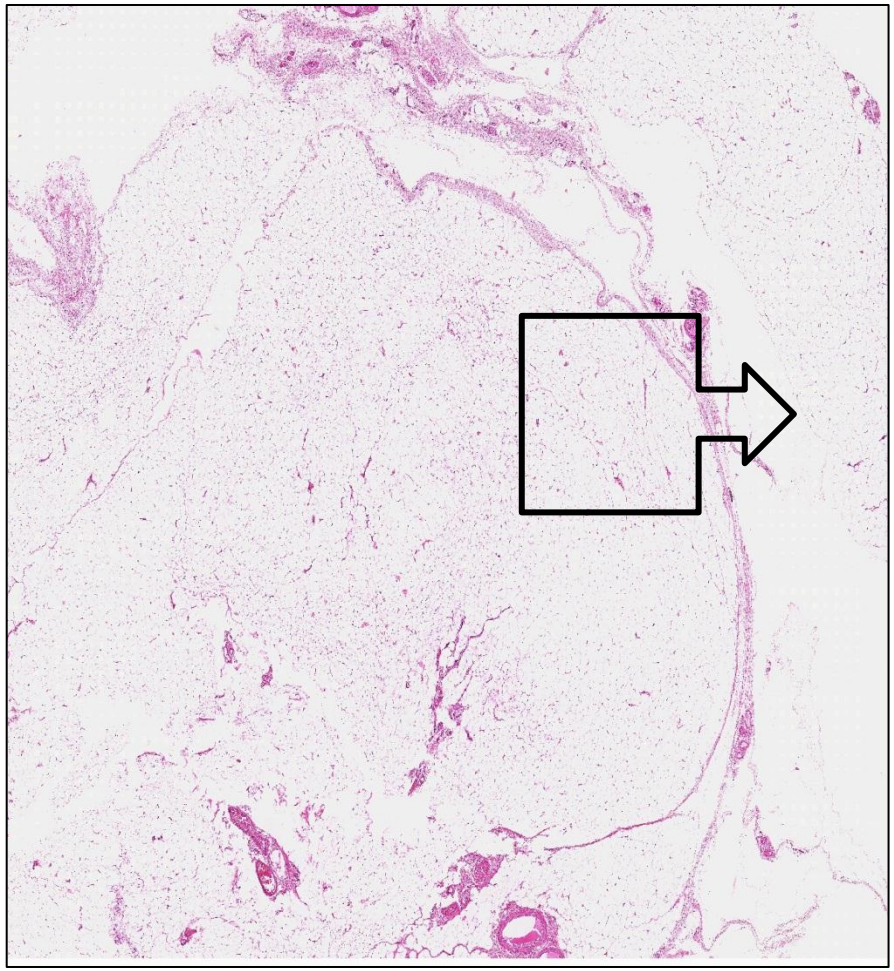
**Diagnosis :**

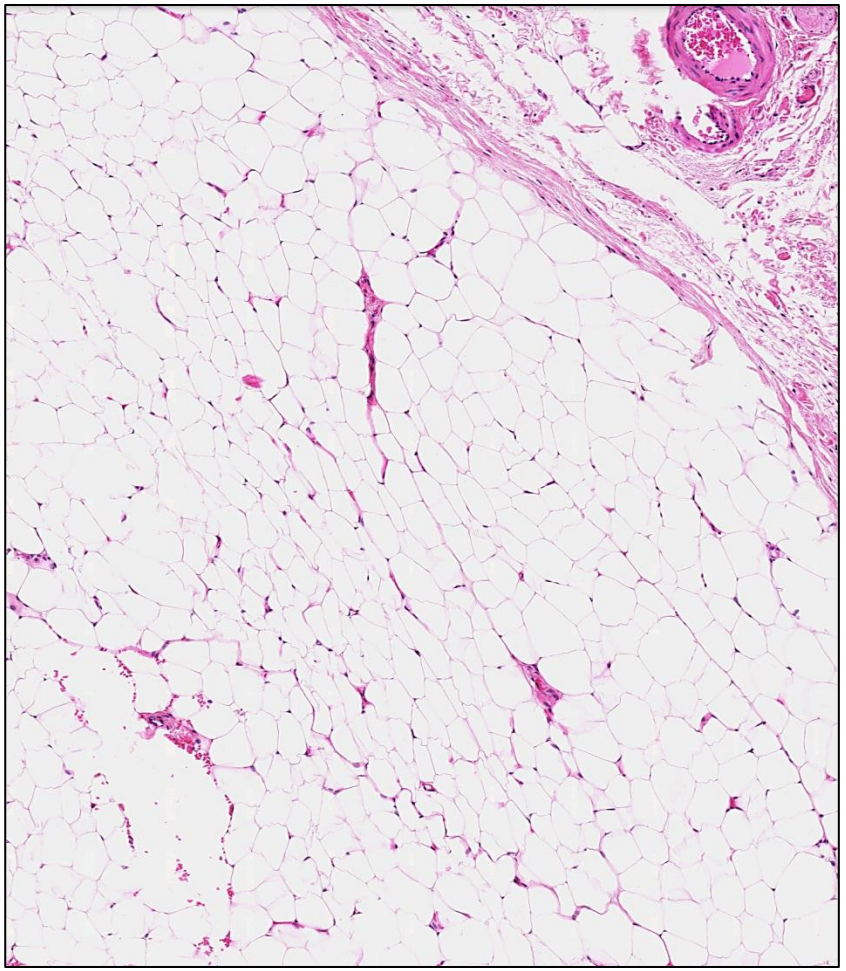
Benign tumor (fibroadenoma in the breast)

**Characteristic feature :**

No invasion , capsulated , will-differentiated cells

# Benign tumor(lipoma)





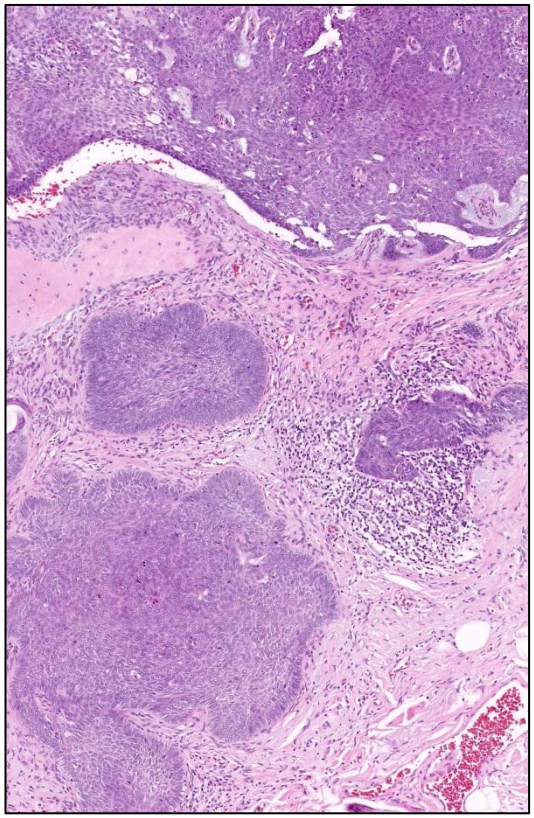
**Diagnosis :**

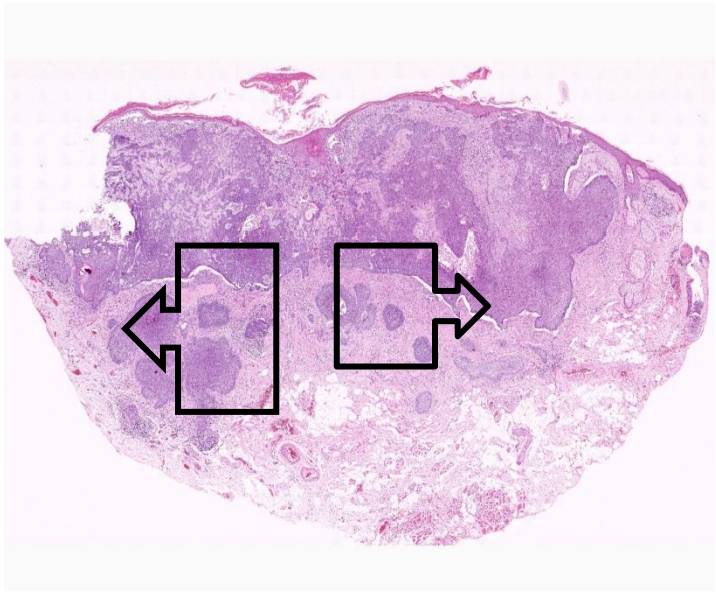
Benign tumor (lipoma)

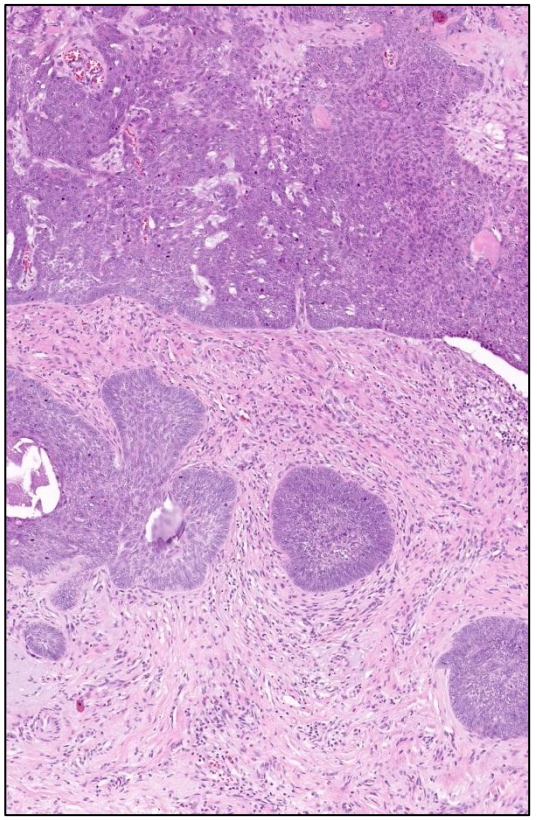
**Characteristic feature :**

No invasion , capsulated , well-differentiation(no anaplastic changes)

# Malignant tumor(basal cell carcinoma)







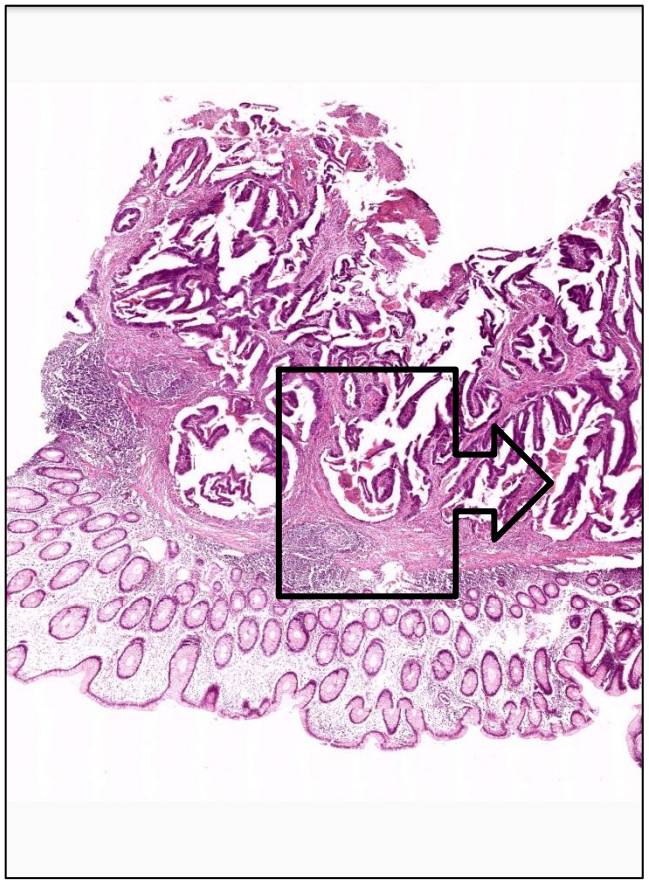
**Diagnosis :**

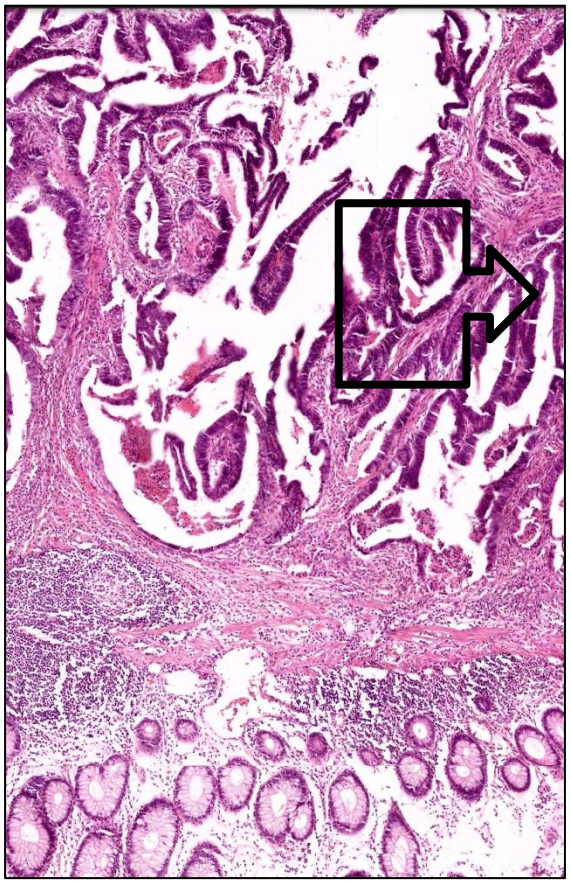
Malignant tumor (basal cell carcinoma)

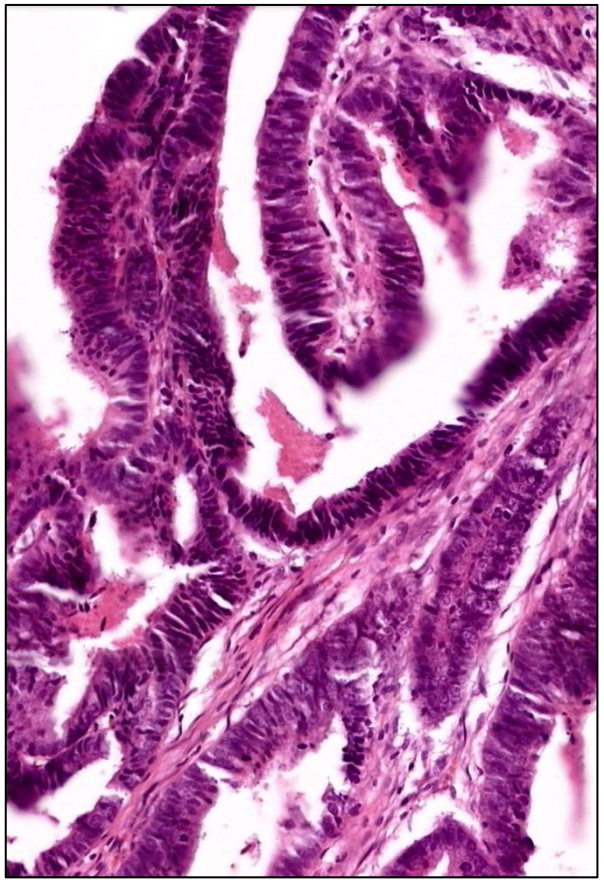
**Characteristic feature :**

Invasion of the surrounding tissue , signs of anaplastic changes (large and hyperchromatic nuclei , prominent nucleoli , mitosis)

# Malignant tumor(colon adenocarcinoma)







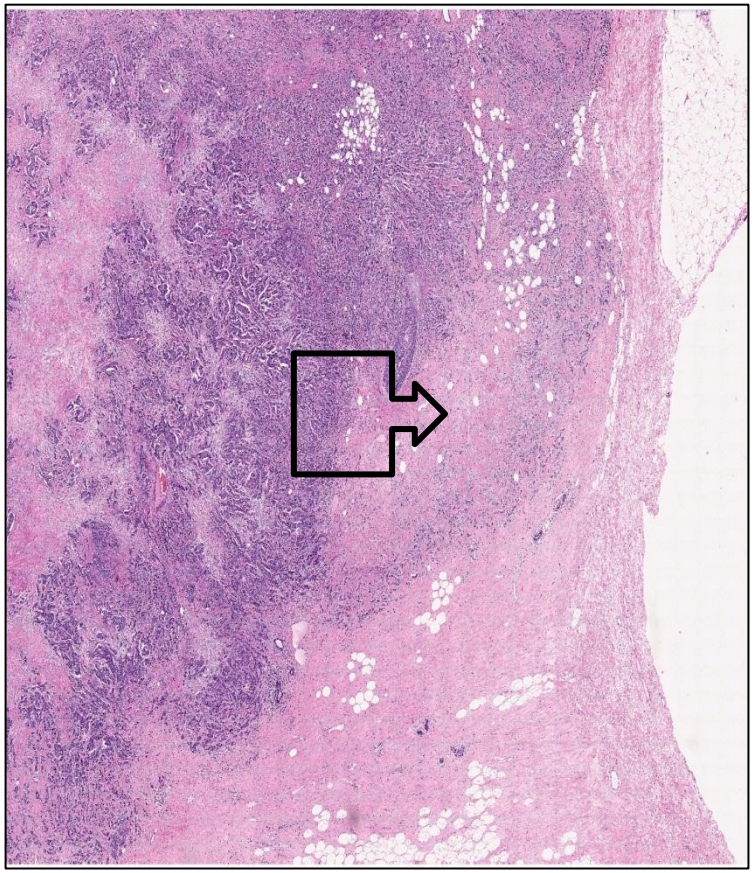
**Diagnosis :**

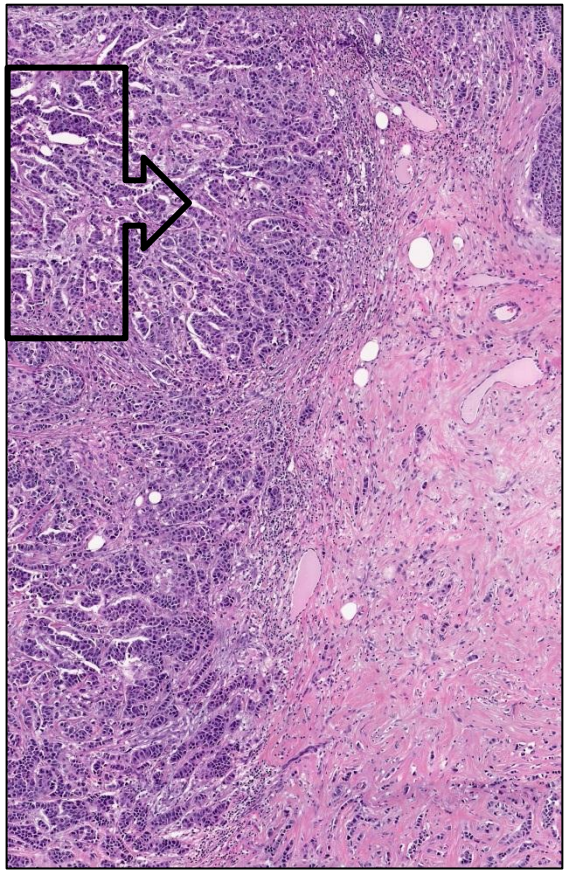
Malignant tumor (colon adenocarcinoma)

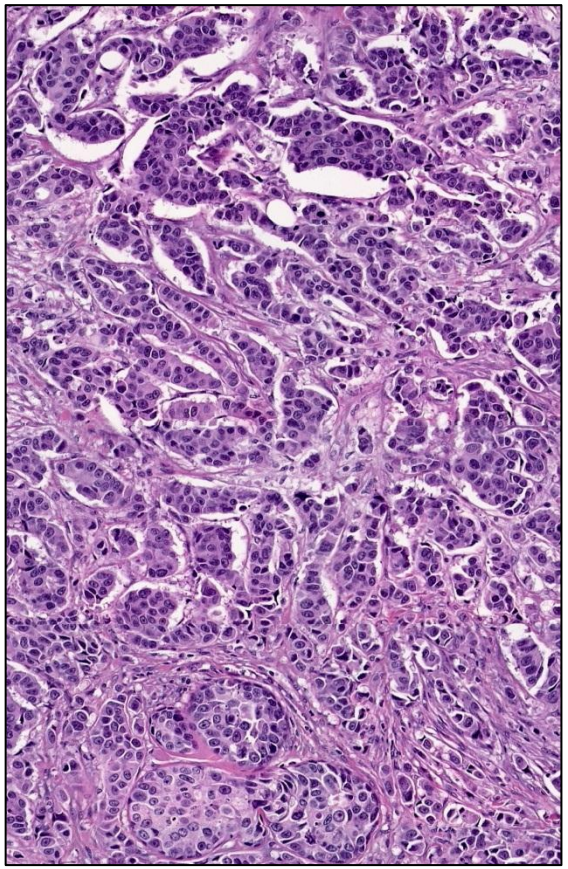
**Characteristic feature :**

Signs of anaplastic changes (large and hyperchromatic nuclei , prominent nucleoli , mitosis) , invasion of the surrounding tissue

# Malignant tumor(ductal carcinoma of breast)







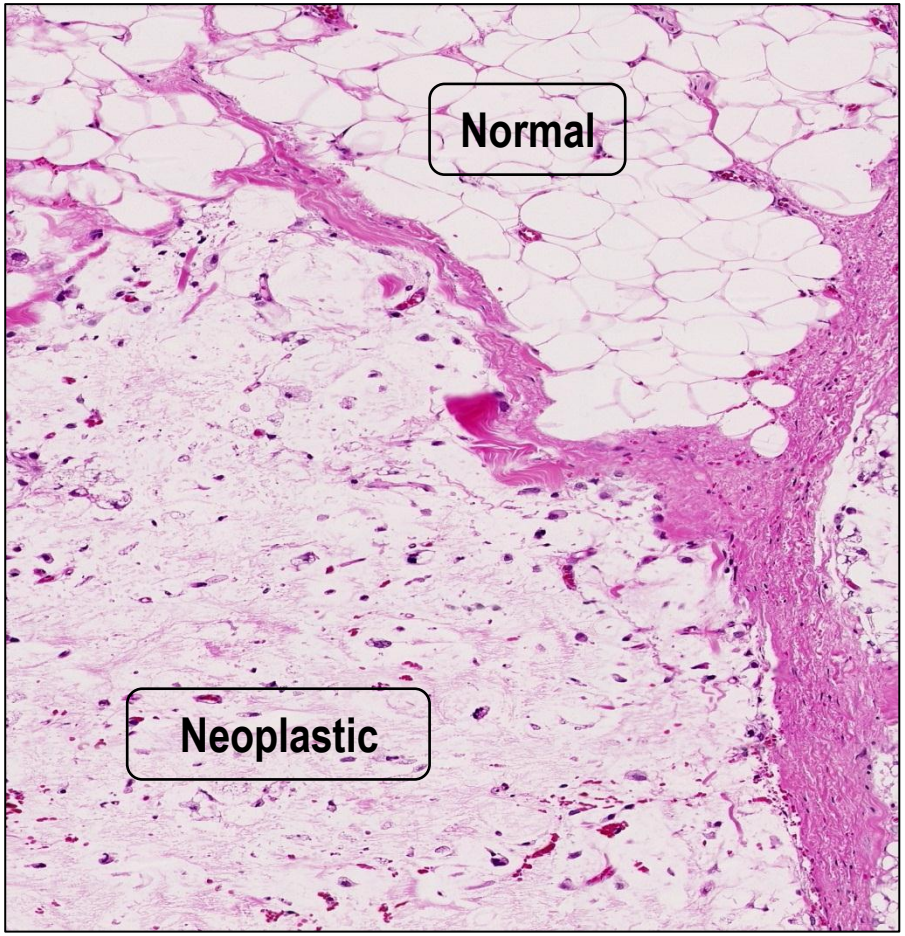
**Diagnosis :**

Malignant tumor (ductal carcinoma of breast)

**Characteristic feature :**

Signs of anaplastic changes (large and hyperchromatic nuclei , prominent nucleoli , mitosis) , invasion of the surrounding tissue

# Malignant tumor (liposarcoma)



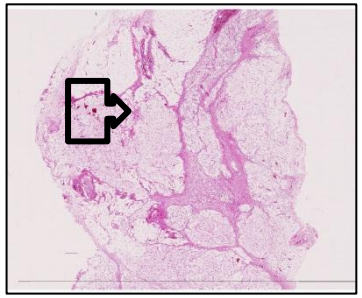

**Diagnosis :**

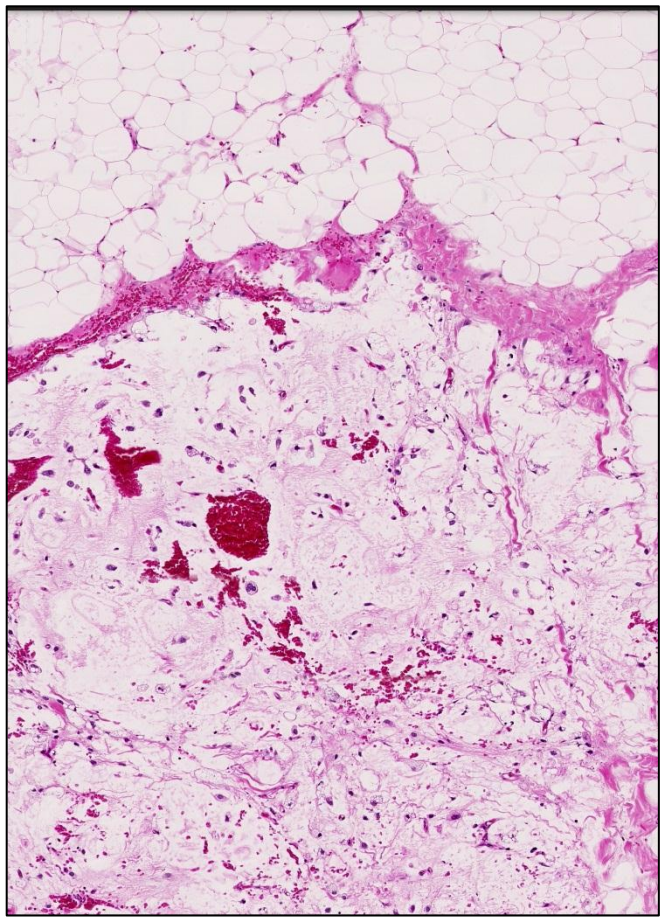
Malignant tumor (liposarcoma)

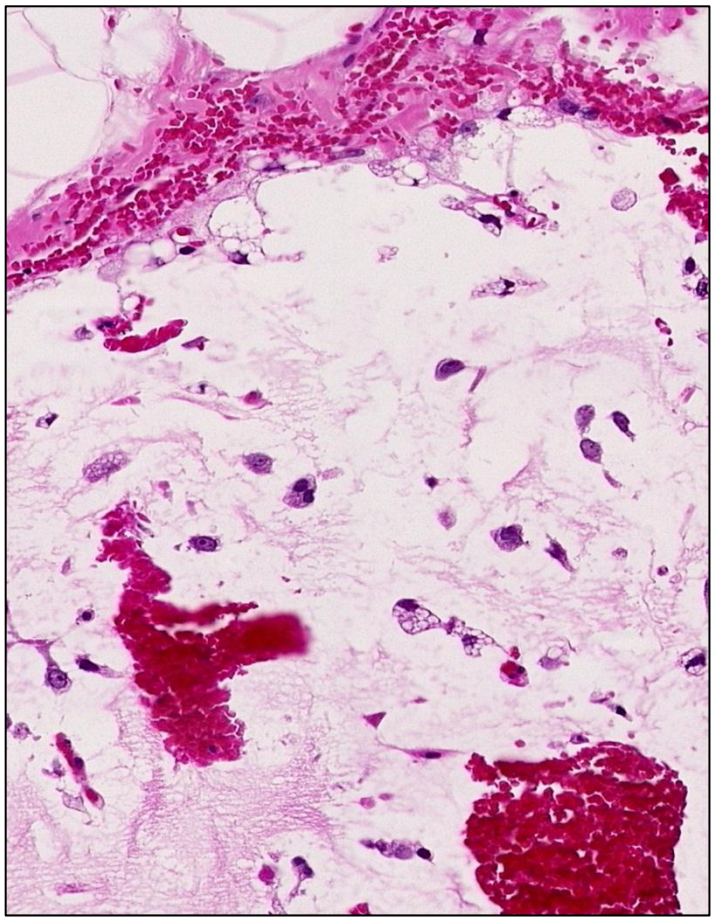
**Characteristic feature :**

Signs of anaplastic changes (large and hyperchromatic nuclei , prominent nucleoli , mitosis) , invasion of the surrounding tissue

## **Malignant tumor (liposarcoma)**{the same slide from different view}







**Diagnosis :**

Malignant tumor (liposarcoma)

**Characteristic feature :**

Signs of anaplastic changes (large and hyperchromatic nuclei , prominent nucleoli , mitosis) , invasion of the surrounding tissue

اسماء الشرائح التي شرحها الدكتور من البرنامج في محاضرة ال neoplasm
لمن يريد ان يتصفحها أكثر

**05-01 Benign Tumor_ Mouth papilloma**

**05-02 Benign tumor_ Breast fibroadenoma**

**05-06 Benign tumor_ Uterus Leiomyoma**

**05-09 Benign tumor_ soft tissue_ Lipoma**

**06-02 Malignant tumor Skin_ Basal cell carcinoma**

**06-04 Malignant tumor Colon_ Adenocarcinoma**

**06-05 Malignant tumor_ Breast_ Ductal carcinoma**

**06-08 liposarcoma-soft tissue**